# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

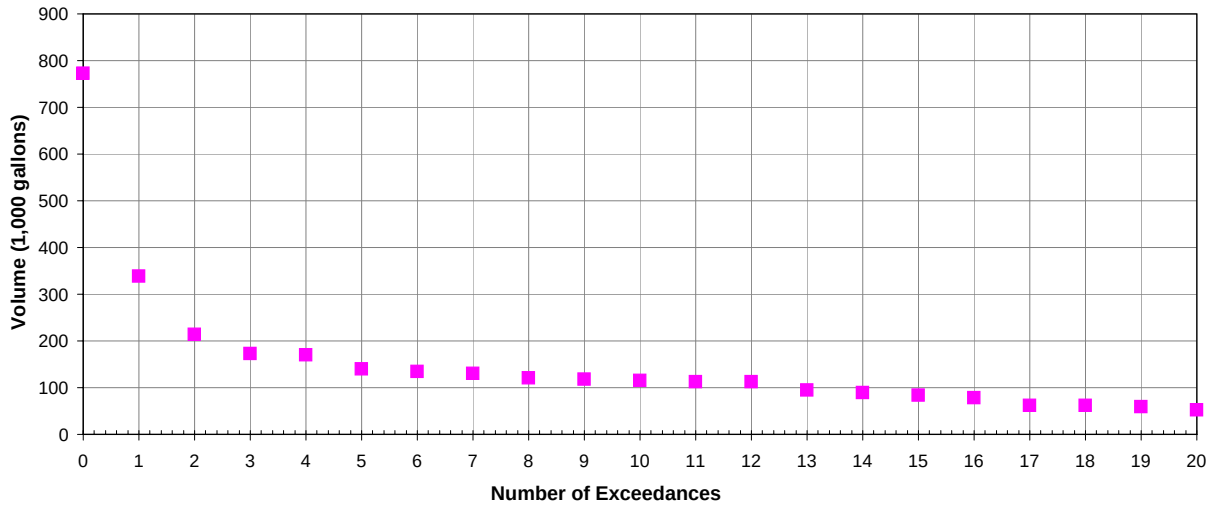
| | |
|---|---|
| **Region Name** | CSO 039E001 to 068H002 |
| **Structures within Region** | CSO 039E001, CSO 039J001, CSO 068H001, CSO 068H002 |
| **Model ID** | CSO 039E001 to 068H002.1 |
| **Structure Type** | Consolidation |
| **PWSA Sewershed** | N/A |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | N/A |
| **Owner** | N/A |

**Results Summary**

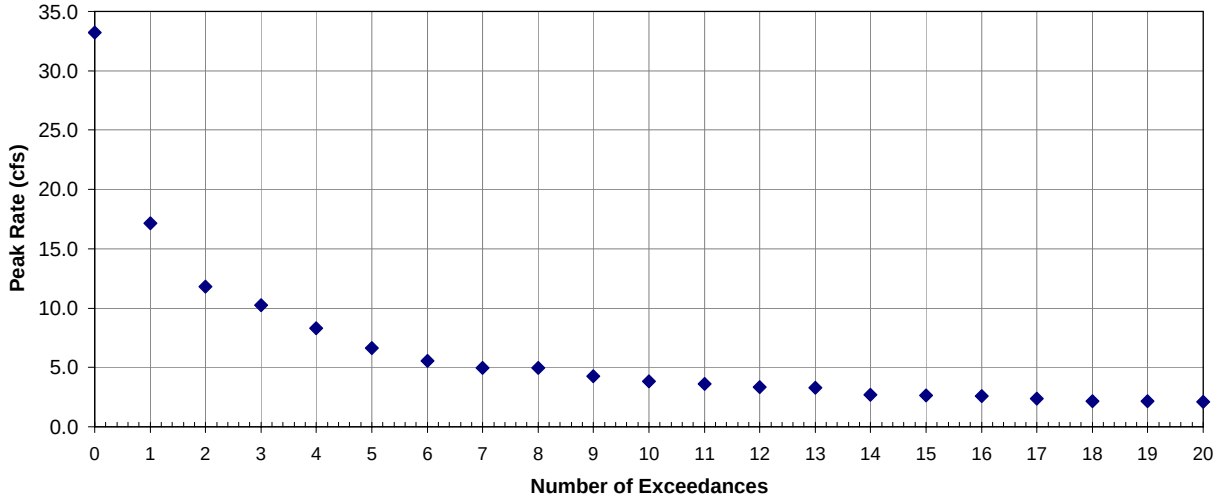
| | |
|---|---|
| Number of Events: | 80 |
| Peak Volume: | 103,207 $ft^3$ |
| | 0.77 MG |
| Total Volume: | 537,979 $ft^3$ |
| | 4.02 MG |
| Peak Rate: | 33.23 cfs |

| | |
|---|---|
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection |

### Figure 1 - CSO 039E001 to 068H002 CSO Volume




### Figure 2 - CSO 039E001 to 068H002 CSO Peak Overflow Rate



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## D.24.3 068H001, 068H002, 039E001, AND 039J001 - BELLS RUN SEWERSHED – NPDES# 068H001, 068H002, 039E001, AND 039J001

### Description of Outfalls

The Bells Run Sewershed is located in portions of East Carnegie, Oakwood and Westwood sections in the City of Pittsburgh and in Crafton Borough and Green Tree Borough. The outfalls 068H001, 068H002, 039E001, and 039J001 have been consolidated into a group for evaluation. Outfall 068H001 conveys overflows from the PWSA diversion chamber 068H001 to Bells Run. Outfalls 068H002, 039E001, and 039J001 convey overflows from the PWSA diversion chambers 068H002, 039E001, and 039J001, respectively. All of these overflows are received by Bells Run. The Bells Run Sewershed consists of 726 acres of residential, business and commercial users. The Bells Run Sewershed is comprised of approximately 301 manholes and 66,326 linear feet (12.6 miles) of sewer up to 66 inches in diameter. This consolidation of outfalls includes flow from 57 acres of the Bells Run Sewershed.

*Attachment 1, Tributary Area Map,* shows the CSO locations and the tributary areas.

The outfalls typically experience 80 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 0.77 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from both outfalls is approximately 33.23 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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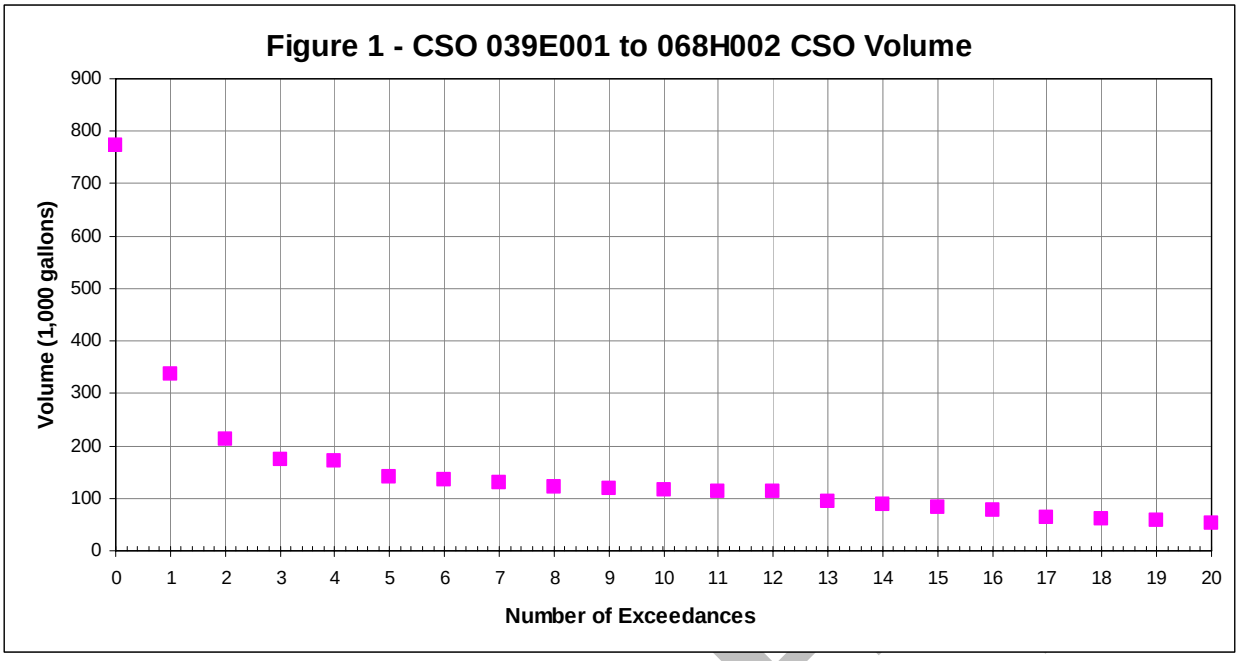


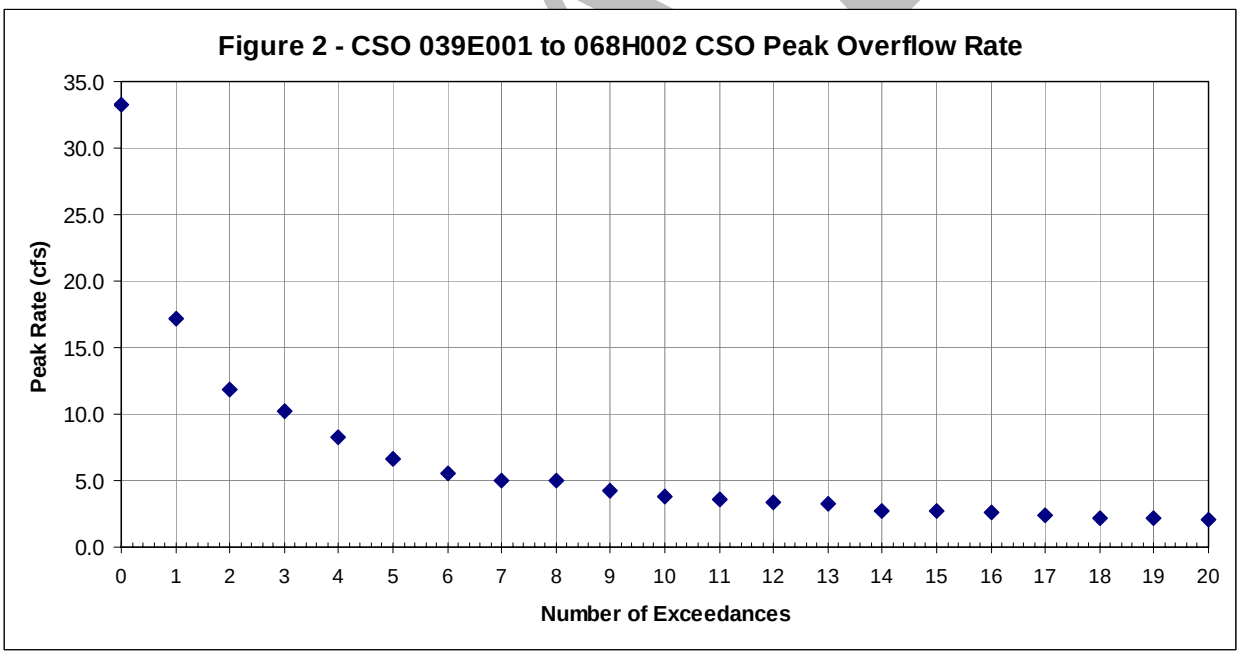


A necessary component of all storage and treatment alternatives would be the construction of consolidation sewers. The sewers are required to convey CSOs from outfalls 068H002, 039E001, and 039J001 to the vicinity of outfall 068H001. There is limited space for a storage or

treatment facility in the vicinity of 068H001 due to steep slopes. Critical infrastructure in this area includes a road and residential development. Bells Run flows at the toe of the steep slopes.

**Description of Consolidated Outfall Alternatives**

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

***Collection System Alternatives***

CS4- 068H001, 068H002, 039E001, 039J001: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

***Storage Alternatives***

S2- 068H001, 068H002, 039E001, 039J001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4- 068H001, 068H002, 039E001, 039J001: Surface Storage

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- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1- 068H001, 068H002, 039E001, 039J001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2- 068H001, 068H002, 039E001, 039J001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3- 068H001, 068H002, 039E001, 039J001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4- 068H001, 068H002, 039E001, 039J001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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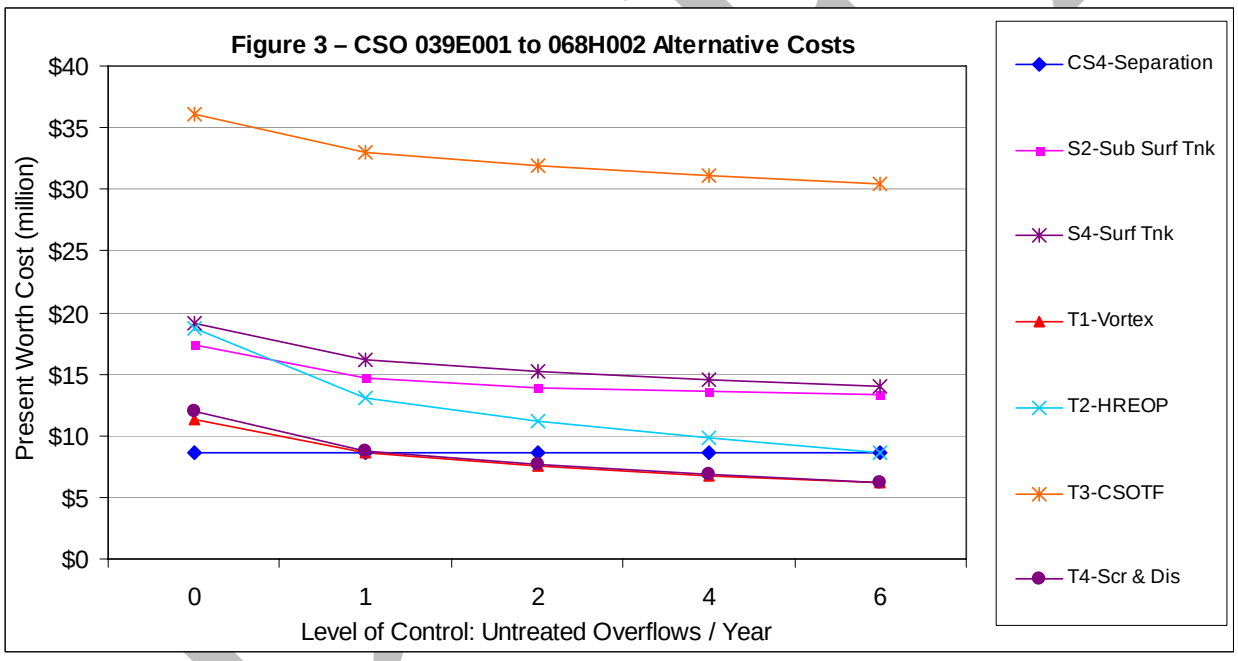
## Alternative Evaluation Results

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – 068H001, 068H002, 039E001, 039J001 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.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**Recommendations**

Based upon the above, for control levels 0 to 4 it is recommended that Alternative CS4-068H001, 068H002, 039E001, 039J001: Sewer Separation be carried forward and re-evaluated with the results of the system-wide alternatives analyses. For control level 6, it is recommended that Alternative T1-068H001, 068H002, 039E001, 039J001: Suspended Solids Control be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

There appears to be limited space available adjacent to the 068H001 outfall for a treatment or storage facility for all control levels. Residential development, Bells Run, a road, and steep slopes bound the area. Significant site work would be required in order to construct a facility.

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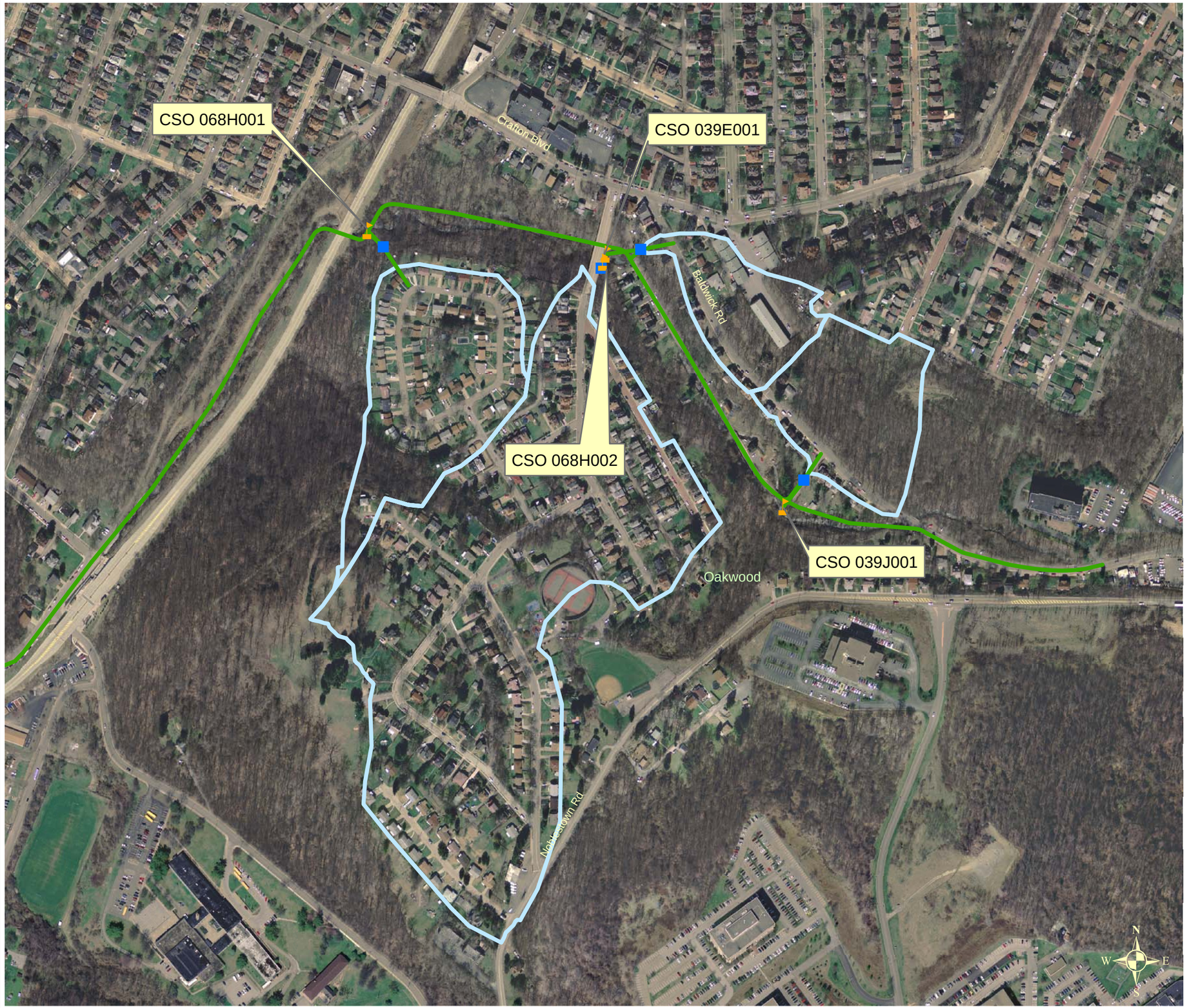


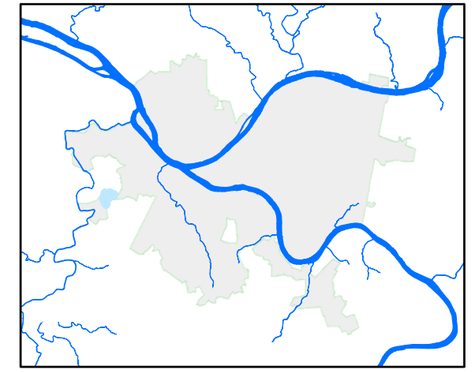

Area Overview

## Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

# Attachment 1
# CSO 039E001 to CSO 068H002 Tributary Area Map
# Bells Run Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

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Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will not be evaluated. |
| Sewer separation | Y | Sewer separation will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with all storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with all treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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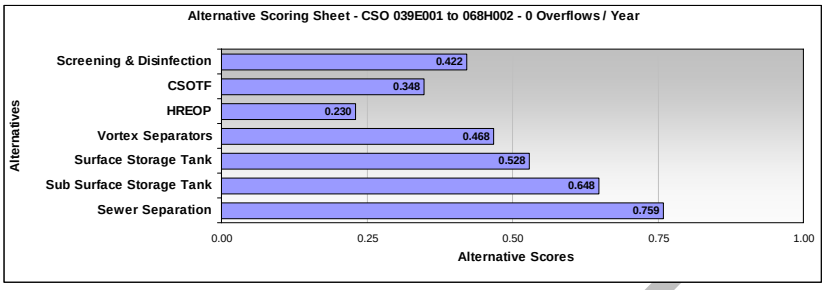
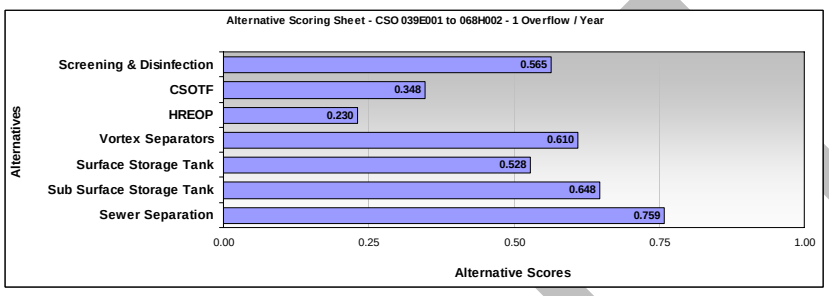
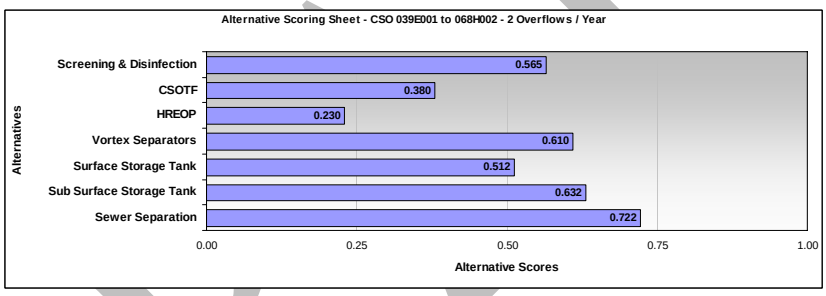
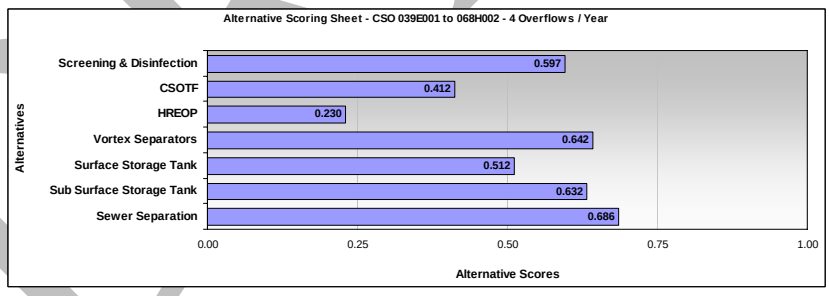
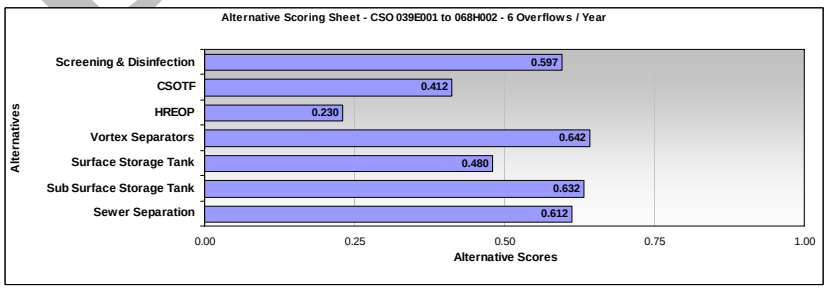
# Attachment 3 – Alternative Scoring Sheet

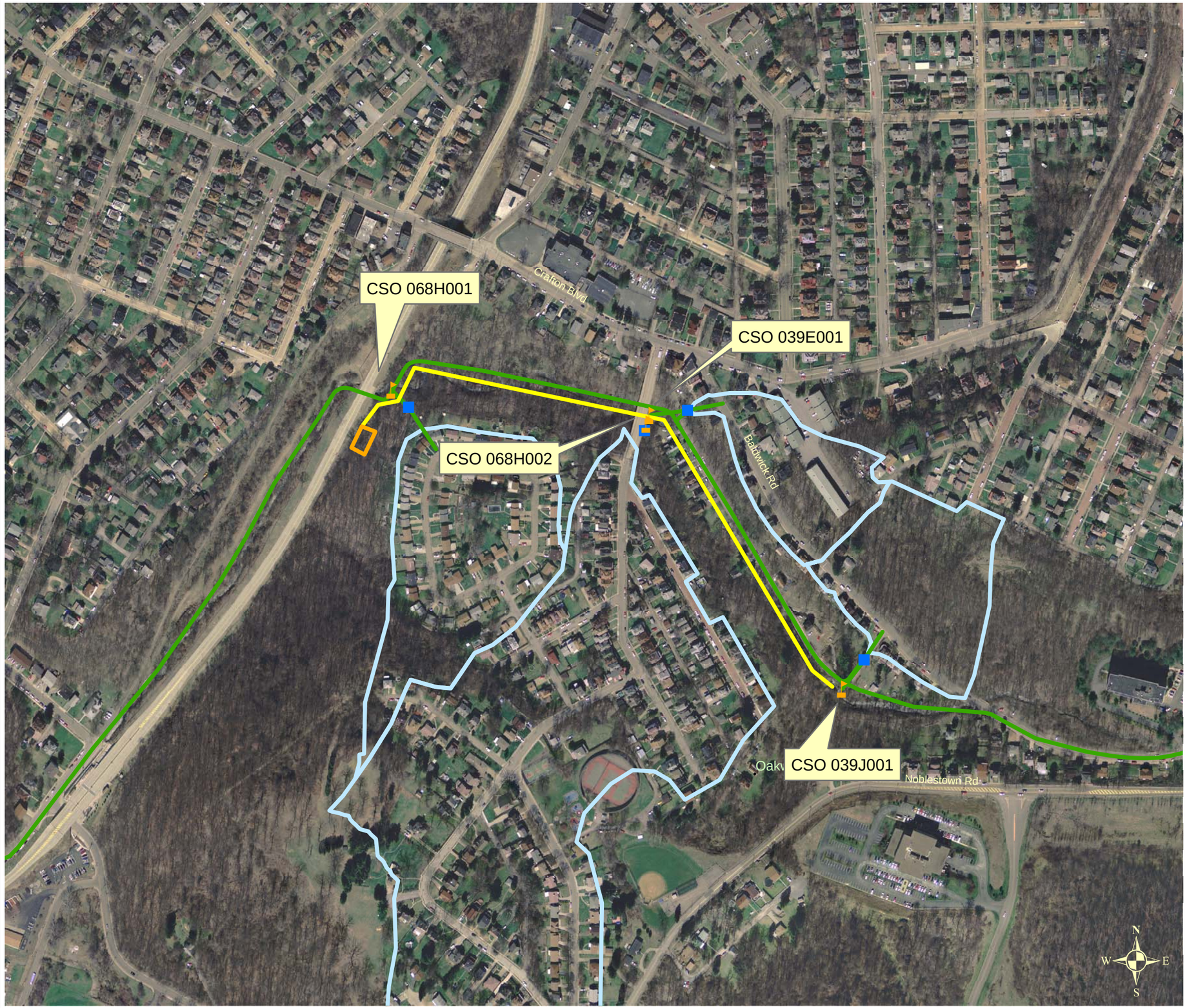


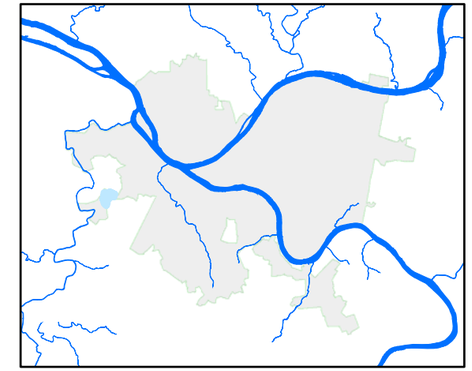





**Area Overview**

## Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- **Trunk Sewer**
- **PWSA Diversion Structure**
- Combined Sewer Outfall

0 330 660 Feet

# Attachment 4
# CSO 039E001 to CSO 068H002 Facilities Boundary Map Bells Run Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 4 | 2 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 4 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 3 | 3 | 3 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 2 | 2 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 2 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.679** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.606** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.707** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.768** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.663** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.615** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.615** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.620** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.455** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.402** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

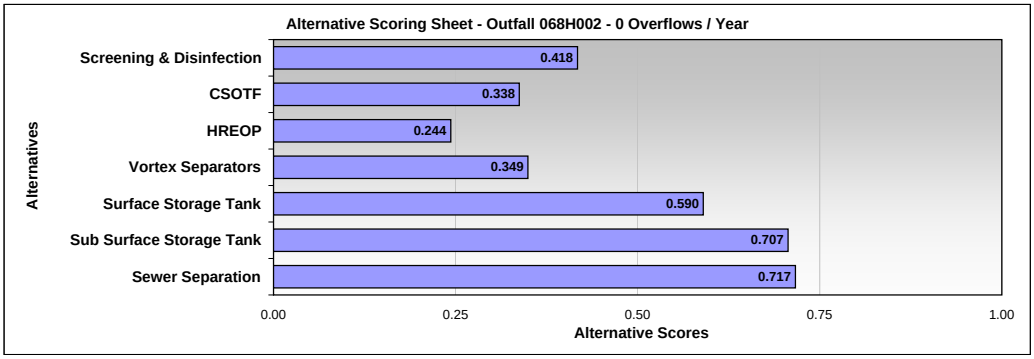
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.454** |

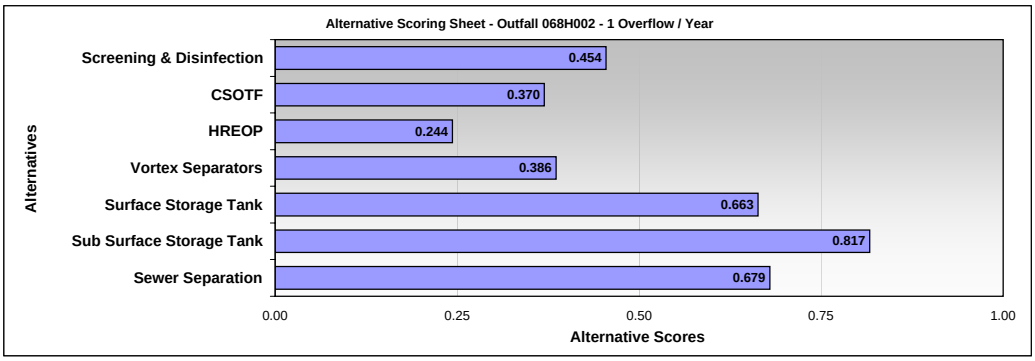
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.454** |

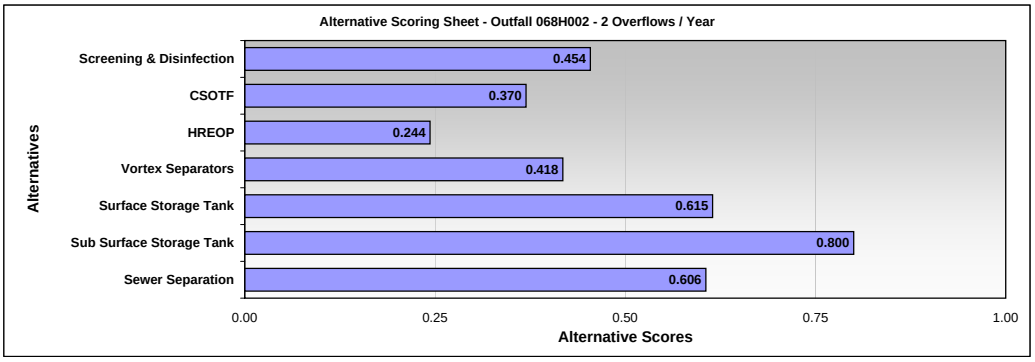
Total Score

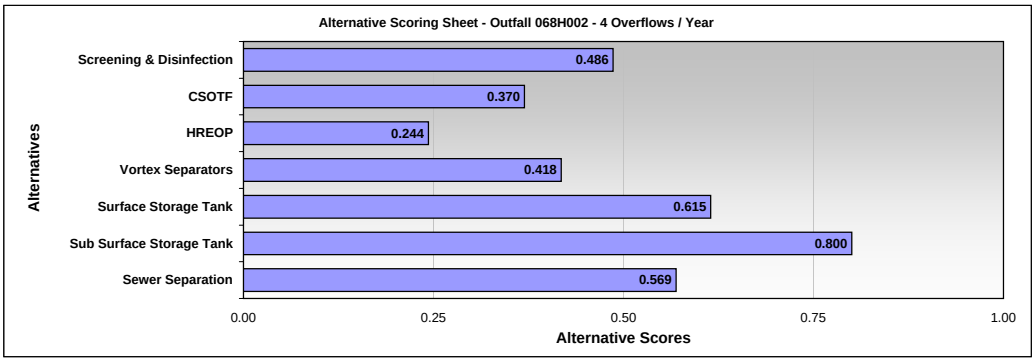
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.486** |

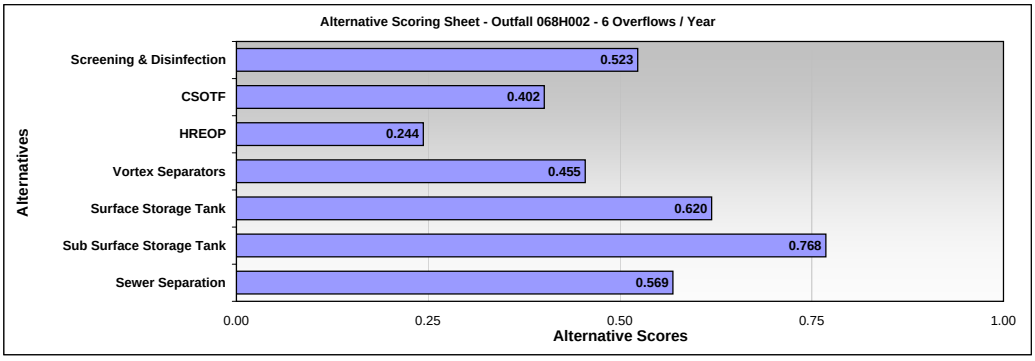
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.523** |


Alternative Scoring Sheet - Outfall 068H002 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.590
0.707
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 068H002 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.454
0.370
0.244
0.386
0.663
0.817
0.679
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 068H002 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.454
0.370
0.244
0.418
0.615
0.800
0.606
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 068H002 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.486
0.370
0.244
0.418
0.615
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 068H002 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.523
0.402
0.244
0.455
0.620
0.768
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 36 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,400,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 15,682 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **31,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,470,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.67 | 89,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.78 | 105,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 103 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 69 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.80 | 106,605 | **Sufficient Volume** |
| Tank Area (SF) | | 7,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **606,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 19.59 | 30.32 | = Peak Rate |
| Force Main Diameter (In) | | 30 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,042,000** | **$ 38,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 30.32 | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 158,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 790 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **76,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 19.59 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,320,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 29,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **6,263,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.67 | | 89,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.78 | | 105,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 103 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 69 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.80 | | 106,605 | **Sufficient Volume** |
| Tank Area (SF) | 7,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,966,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.67 | | 1.03 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 6 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 851,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 30.32 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 158,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 7,900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 462,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 19.59 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 1,320,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | $ | - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 29,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 58,000** | | | |
| **TOTAL CAPITAL COST** | **$ 5,796,000** | | | |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 19.59 | | 30.32 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 3 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,859,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 21.55 | | 33.35 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 32 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,281,000** | **$** | **40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 30.32 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 87,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 4,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **290,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 19.59 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,320,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 21.55 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 73 | | 35 | |
| Passes / Detention (Min) | | 3 | | 15.32 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **775,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 20,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,988,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 19.59 | | 30.32 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 3,300 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 82 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 41 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.30 | | 40,344 | |
| **Construction Cost (CSOTF)** | **$** | **16,372,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 19.59 | | 30.32 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 30 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,042,000** | **$** | **38,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 30.32 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 61,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,050 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **219,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 19.59 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,320,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 19.59 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 70 | | 33 | |
| Passes / Detention (Min) | | 3 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **737,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 13,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **26,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **22,877,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 19.59 | | 30.32 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 240 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 23 | | **OK** | Input by Engineer |
| Width (Ft) | | 11 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **4,296,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 21.55 | | 33.35 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 32 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,281,000** | **$** | **40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 30.32 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 300 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **36,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 19.59 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,320,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 21.55 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 73 | | 35 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.32** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 775,000 | $ | 653,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,428,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 31,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **62,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **11,586,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 89,067 | CF |
| | 0.67 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 30.32 | CFS |
| | 19.59 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 19.59 | | 30.32 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,320,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 19.59 | | 30.32 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 30 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,042,000** | **$** | **38,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 30.32 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 310 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **37,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 19.59 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 70 | | 33 | |
| Passes / Detention (Min) | | 3 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 737,000 | $ | 614,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,351,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **6,961,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 36 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,400,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 15,682 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **31,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,470,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.31 | | 41,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.36 | | 48,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 70 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 47 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.37 | | 49,350 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **259,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 9.80 | | 15.16 | = Peak Rate |
| Force Main Diameter (In) | 22 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,788,000** | **$** | **30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.16 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 72,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 360 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **41,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 9.80 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **866,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,134,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.31 | | 41,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.36 | | 48,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 70 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 47 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.37 | | 49,350 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,857,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.31 | | 0.47 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **545,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.16 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 72,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **250,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 9.80 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **866,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,682,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 1 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.80 | 15.16 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 10.78 | 16.68 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 23 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,876,000** | **$ 31,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.16 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 9.80 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **866,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 10.78 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 52 | 25 | |
| Passes | | 3 | **15.59** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **562,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 10,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 4,717,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.80 | 15.16 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 59 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 30 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.16 | 21,240 | |
| **Construction Cost (CSOTF)** | **$** | **16,382,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 9.80 | 15.16 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 22 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,788,000** | **$ 30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.16 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 32,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **132,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 9.80 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **866,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 9.80 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 50 | 24 | |
| Passes | | 3 | **15.83** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **542,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 9,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **20,860,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.80 | | 15.16 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 120 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 16 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,739,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 10.78 | | 16.68 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 23 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,876,000** | **$** | **31,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.16 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 9.80 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **866,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 10.78 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 52 | | 25 | Input by Engineer |
| Passes | | 3 | | **15.59** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 562,000 | $ | 434,000 | |
| **Construction Cost (Disinfection)** | **$** | **996,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 26,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **7,683,000** | | | |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 40,921 | CF |
| | 0.31 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 15.16 | CFS |
| | 9.80 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **1 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 9.80 | | 15.16 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **866,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 9.80 | | 15.16 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 22 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,788,000** | **$** | **30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.16 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 9.80 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 50 | | 24 | |
| Passes | | 3 | | **15.83** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 542,000 | $ | 416,000 | |
| **Construction Cost (Disinfection)** | **$** | **958,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,811,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 36 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,400,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 15,682 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **31,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,470,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.23 | | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 57 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 38 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.24 | | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **159,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 6.63 | | 10.25 | = Peak Rate |
| Force Main Diameter (In) | 18 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,430,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 10.25 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 47,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 240 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **30,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 6.63 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **719,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,510,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.23 | | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 57 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 38 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.24 | | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,516,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.20 | | 0.30 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **451,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 10.25 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 47,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **179,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 6.63 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **719,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,025,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 6.63 | | 10.25 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.29 | | 11.28 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,514,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 10.25 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 6.63 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **719,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 7.29 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | | 21 | |
| Passes | | 3 | | **16.01** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **491,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 7,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,127,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 6.63 | 10.25 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,200 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 50 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 25 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.11 | 15,000 | |
| **Construction Cost (CSOTF)** | **$** | **16,386,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.63 | 10.25 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,430,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 10.25 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **102,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 6.63 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **719,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 6.63 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 41 | 20 | |
| Passes | | 3 | **15.99** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **477,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 8,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **20,258,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 6.63 | | 10.25 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 80 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 14 | | **OK** | Input by Engineer |
| Width (Ft) | | 7 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,240,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.29 | | 11.28 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,514,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 10.25 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 6.63 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **719,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 7.29 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | | 21 | Input by Engineer |
| Passes | | 3 | | **16.01** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 491,000 | $ | 356,000 | |
| **Construction Cost (Disinfection)** | **$** | **847,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,514,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 26,112 | CF |
| | 0.20 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 10.25 | CFS |
| | 6.63 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **2 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 6.63 | | 10.25 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **719,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 6.63 | | 10.25 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,430,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 10.25 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 110 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **16,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 6.63 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 41 | | 20 | |
| Passes | | 3 | | **15.99** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 477,000 | $ | 339,000 | |
| **Construction Cost (Disinfection)** | **$** | **816,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,155,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 36 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,400,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 15,682 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **31,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,470,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.14 | 18,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.16 | 21,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 47 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 32 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.17 | 22,560 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **109,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 4.74 | 7.33 | = Peak Rate |
| Force Main Diameter (In) | | 15 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,164,000** | **$ 24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.33 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 32,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 160 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **22,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.74 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **632,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,095,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.14 | | 18,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.16 | | 21,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 47 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 32 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.17 | | 22,560 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,340,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.14 | | 0.21 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **402,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.33 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 32,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **132,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 4.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **632,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,664,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.74 | | 7.33 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.21 | | 8.07 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,235,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.33 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **632,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | | 17 | |
| Passes | | 3 | | **15.59** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **448,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,712,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.74 | | 7.33 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 800 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 41 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 21 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | | 10,332 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.74 | | 7.33 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,164,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.33 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 15,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 750 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **73,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **632,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.74 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 17 | |
| Passes | | 3 | | **16.23** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **438,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **19,837,000** | | | |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.74 | | 7.33 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 60 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 12 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,943,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.21 | | 8.07 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,235,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.33 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **632,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | | 17 | Input by Engineer |
| Passes | | 3 | | **15.59** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 448,000 | $ | 301,000 | |
| **Construction Cost (Disinfection)** | **$** | **749,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,749,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 18,471 | CF |
| | 0.14 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 7.33 | CFS |
| | 4.74 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.74 | | 7.33 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **632,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.74 | | 7.33 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,164,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.33 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.74 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 17 | |
| Passes | | 3 | | **16.23** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 438,000 | $ | 291,000 | |
| **Construction Cost (Disinfection)** | **$** | **729,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,710,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 36 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,400,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 15,682 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **31,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,470,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.11 | | 15,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.13 | | 18,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 43 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 29 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.14 | | 18,705 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **85,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 3.26 | | 5.04 | = Peak Rate |
| Force Main Diameter (In) | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,929,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.04 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 27,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 140 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **20,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 3.26 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **563,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,762,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.11 | | 15,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.13 | | 18,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 43 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 29 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.14 | | 18,705 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,251,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.11 | | 0.17 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 7.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **377,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.04 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 27,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **116,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.26 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **563,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,464,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.26 | | 5.04 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.59 | | 5.55 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,983,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.04 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.26 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **563,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.59 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | |
| Passes | | 3 | | **16.22** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **413,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,349,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.26 | 5.04 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.26 | 5.04 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.4 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,929,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 5.04 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.26 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **563,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.26 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | 14 | |
| Passes | | 3 | **16.10** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **407,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,488,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.26 | | 5.04 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,711,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.59 | | 5.55 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,983,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.04 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.26 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **563,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.59 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | Input by Engineer |
| Passes | | 3 | | **16.22** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 413,000 | $ | 255,000 | |
| **Construction Cost (Disinfection)** | **$** | **668,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,104,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 79 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,620 | CF |
| | 0.11 | MG |
| Total Volume | 470,227 | CF |
| | 3.52 | MG |
| Peak Rate | 5.04 | CFS |
| | 3.26 | MGD |

| Capital Costs - 068H002 / Sewershed CSO 068H002 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.26 | | 5.04 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **563,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.26 | | 5.04 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,929,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.04 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.26 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **16.10** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 407,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **653,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,323,000** | | | |

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| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 19.59 | $137,202 | 20 | 10.910 | $1,496,868 |
| | Tank O&M | No. Events / Yr | 79 | $50,053 | 50 | 14.484 | $724,941 |
| | | Const Cost ($) | $606,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 20 | $9,130 | 20 | 10.910 | $99,606 |
| | Odor Control O&M | Capacity (cfm) | 790 | $2,765 | 20 | 10.910 | $30,166 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,288 |
| | | | **Total Annual O&M** | **$200,000** | | **Total PW O&M** | **$2,372,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.67 | $14,330 | 20 | 10.910 | $156,340 |
| | Tank O&M | No. Events / Yr | 79 | $55,953 | 50 | 14.484 | $810,395 |
| | | Const Cost ($) | $2,966,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 20 | $9,130 | 20 | 10.910 | $99,606 |
| | Odor Control O&M | Capacity (cfm) | 7,900 | $27,650 | 20 | 10.910 | $301,660 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,319 |
| | | | **Total Annual O&M** | **$108,000** | | **Total PW O&M** | **$1,376,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 19.59 | $137,202 | 20 | 10.910 | $1,496,868 |
| | Sed. Basin O&M | Flow Rate (mgd) | 19.59 | $2,204 | 50 | 14.484 | $31,927 |
| | Screening O&M | Flow Rate (mgd) | 19.59 | $9,130 | 20 | 10.910 | $99,606 |
| | Disinfection O&M | Flow Rate (mgd) | 19.59 | $98,504 | 20 | 10.910 | $1,074,668 |
| | Odor Control O&M | Capacity (cfm) | 3,050.00 | $10,675 | 20 | 10.910 | $116,464 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,682 |
| | | | **Total Annual O&M** | **$258,000** | | **Total PW O&M** | **$2,842,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 21.55 | $146,223 | 20 | 10.910 | $1,595,284 |
| | HREP O&M | Flow Rate (mgd) | 19.59 | $134,001 | 20 | 10.910 | $1,461,946 |
| | Screening O&M | Flow Rate (mgd) | 19.59 | $9,130 | 20 | 10.910 | $99,606 |
| | Disinfection O&M | Flow Rate (mgd) | 21.55 | $104,392 | 20 | 10.910 | $1,138,914 |
| | Odor Control O&M | Capacity (cfm) | 300.00 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $34,948 |
| | | | **Total Annual O&M** | **$395,000** | | **Total PW O&M** | **$4,342,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 21.55 | $146,223 | 20 | 10.910 | $1,595,284 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 19.59 | $2,204 | 20 | 10.910 | $24,049 |
| | Screening O&M | Flow Rate (mgd) | 19.59 | $9,130 | 20 | 10.910 | $99,606 |
| | Disinfection O&M | Flow Rate (mgd) | 21.55 | $104,392 | 20 | 10.910 | $1,138,914 |
| | Odor Control O&M | Capacity (cfm) | 4,350.00 | $15,225 | 20 | 10.910 | $166,104 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,482 |
| | | | **Total Annual O&M** | **$278,000** | | **Total PW O&M** | **$3,050,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 19.59 | $137,202 | 20 | 10.910 | $1,496,868 |
| | Screening O&M | Flow Rate (mgd) | 19.59 | $9,130 | 20 | 10.910 | $99,606 |
| | Disinfection O&M | Flow Rate (mgd) | 19.59 | $98,504 | 20 | 10.910 | $1,074,668 |
| | Odor Control O&M | Capacity (cfm) | 310.00 | $1,085 | 20 | 10.910 | $11,837 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,187 |
| | | | **Total Annual O&M** | **$246,000** | | **Total PW O&M** | **$2,705,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 9.80 | $86,348 | 20 | 10.910 | $942,053 |
| | Tank O&M | No. Events / Yr | 79 | $49,185 | 50 | 14.484 | $712,377 |
| | | Const Cost ($) | $259,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,265 | 20 | 10.910 | $90,173 |
| | Odor Control O&M | Capacity (cfm) | 360 | $1,260 | 20 | 10.910 | $13,747 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,842 |
| | | | **Total Annual O&M** | **$146,000** | | **Total PW O&M** | **$1,772,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.31 | $8,523 | 20 | 10.910 | $92,984 |
| | Tank O&M | No. Events / Yr | 79 | $53,180 | 50 | 14.484 | $770,239 |
| | | Const Cost ($) | $1,857,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,265 | 20 | 10.910 | $90,173 |
| | Odor Control O&M | Capacity (cfm) | 3,600 | $12,600 | 20 | 10.910 | $137,465 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,259 |
| | | | **Total Annual O&M** | **$83,000** | | **Total PW O&M** | **$1,096,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 9.80 | $86,348 | 20 | 10.910 | $942,053 |
| | Sed. Basin O&M | Flow Rate (mgd) | 9.80 | $1,102 | 50 | 14.484 | $15,964 |
| | Screening O&M | Flow Rate (mgd) | 9.80 | $8,265 | 20 | 10.910 | $90,173 |
| | Disinfection O&M | Flow Rate (mgd) | 9.80 | $64,576 | 20 | 10.910 | $704,524 |
| | Odor Control O&M | Capacity (cfm) | 1,600.00 | $5,600 | 20 | 10.910 | $61,096 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,564 |
| | | | **Total Annual O&M** | **$166,000** | | **Total PW O&M** | **$1,829,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 10.78 | $92,025 | 20 | 10.910 | $1,003,991 |
| | HREP O&M | Flow Rate (mgd) | 9.80 | $89,142 | 20 | 10.910 | $972,533 |
| | Screening O&M | Flow Rate (mgd) | 9.80 | $8,265 | 20 | 10.910 | $90,173 |
| | Disinfection O&M | Flow Rate (mgd) | 10.78 | $68,437 | 20 | 10.910 | $746,642 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,125 |
| | | | **Total Annual O&M** | **$259,000** | | **Total PW O&M** | **$2,842,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 10.78 | $92,025 | 20 | 10.910 | $1,003,991 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 9.80 | $1,102 | 20 | 10.910 | $12,025 |
| | Screening O&M | Flow Rate (mgd) | 9.80 | $8,265 | 20 | 10.910 | $90,173 |
| | Disinfection O&M | Flow Rate (mgd) | 10.78 | $68,437 | 20 | 10.910 | $746,642 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,618 |
| | | | **Total Annual O&M** | **$170,000** | | **Total PW O&M** | **$1,868,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 9.80 | $86,348 | 20 | 10.910 | $942,053 |
| | Screening O&M | Flow Rate (mgd) | 9.80 | $8,265 | 20 | 10.910 | $90,173 |
| | Disinfection O&M | Flow Rate (mgd) | 9.80 | $64,576 | 20 | 10.910 | $704,524 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,262 |
| | | | **Total Annual O&M** | **$160,000** | | **Total PW O&M** | **$1,758,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 6.63 | $66,499 | 20 | 10.910 | $725,505 |
| | Tank O&M | No. Events / Yr | 79 | $48,935 | 50 | 14.484 | $708,756 |
| | | Const Cost ($) | $159,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $7,993 | 20 | 10.910 | $87,202 |
| | Odor Control O&M | Capacity (cfm) | 240 | $840 | 20 | 10.910 | $9,164 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,952 |
| | | | **Total Annual O&M** | **$125,000** | | **Total PW O&M** | **$1,543,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.20 | $6,313 | 20 | 10.910 | $68,875 |
| | Tank O&M | No. Events / Yr | 79 | $52,328 | 50 | 14.484 | $757,892 |
| | | Const Cost ($) | $1,516,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $7,993 | 20 | 10.910 | $87,202 |
| | Odor Control O&M | Capacity (cfm) | 2,350 | $8,225 | 20 | 10.910 | $89,734 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,283 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$1,008,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 6.63 | $66,499 | 20 | 10.910 | $725,505 |
| | Sed. Basin O&M | Flow Rate (mgd) | 6.63 | $746 | 50 | 14.484 | $10,798 |
| | Screening O&M | Flow Rate (mgd) | 6.63 | $7,993 | 20 | 10.910 | $87,202 |
| | Disinfection O&M | Flow Rate (mgd) | 6.63 | $50,891 | 20 | 10.910 | $555,216 |
| | Odor Control O&M | Capacity (cfm) | 1,150.00 | $4,025 | 20 | 10.910 | $43,913 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,445 |
| | | | **Total Annual O&M** | **$131,000** | | **Total PW O&M** | **$1,436,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 7.29 | $70,872 | 20 | 10.910 | $773,206 |
| | HREP O&M | Flow Rate (mgd) | 6.63 | $70,832 | 20 | 10.910 | $772,774 |
| | Screening O&M | Flow Rate (mgd) | 6.63 | $7,993 | 20 | 10.910 | $87,202 |
| | Disinfection O&M | Flow Rate (mgd) | 7.29 | $53,933 | 20 | 10.910 | $588,407 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,682 |
| | | | **Total Annual O&M** | **$204,000** | | **Total PW O&M** | **$2,245,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 7.29 | $70,872 | 20 | 10.910 | $773,206 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 6.63 | $746 | 20 | 10.910 | $8,134 |
| | Screening O&M | Flow Rate (mgd) | 6.63 | $7,993 | 20 | 10.910 | $87,202 |
| | Disinfection O&M | Flow Rate (mgd) | 7.29 | $53,933 | 20 | 10.910 | $588,407 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,548 |
| | | | **Total Annual O&M** | **$134,000** | | **Total PW O&M** | **$1,470,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 6.63 | $66,499 | 20 | 10.910 | $725,505 |
| | Screening O&M | Flow Rate (mgd) | 6.63 | $7,993 | 20 | 10.910 | $87,202 |
| | Disinfection O&M | Flow Rate (mgd) | 6.63 | $50,891 | 20 | 10.910 | $555,216 |
| | Odor Control O&M | Capacity (cfm) | 110.00 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,211 |
| | | | **Total Annual O&M** | **$126,000** | | **Total PW O&M** | **$1,385,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.74 | $53,155 | 20 | 10.910 | $579,916 |
| | Tank O&M | No. Events / Yr | 79 | $48,810 | 50 | 14.484 | $706,946 |
| | | Const Cost ($) | $109,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,832 | 20 | 10.910 | $85,452 |
| | Odor Control O&M | Capacity (cfm) | 160 | $560 | 20 | 10.910 | $6,110 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,608 |
| | | | **Total Annual O&M** | **$111,000** | | **Total PW O&M** | **$1,389,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.14 | $5,009 | 20 | 10.910 | $54,653 |
| | Tank O&M | No. Events / Yr | 79 | $51,888 | 50 | 14.484 | $751,519 |
| | | Const Cost ($) | $1,340,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,832 | 20 | 10.910 | $85,452 |
| | Odor Control O&M | Capacity (cfm) | 1,600 | $5,600 | 20 | 10.910 | $61,096 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,718 |
| | | | **Total Annual O&M** | **$71,000** | | **Total PW O&M** | **$956,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.74 | $53,155 | 20 | 10.910 | $579,916 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.74 | $533 | 50 | 14.484 | $7,722 |
| | Screening O&M | Flow Rate (mgd) | 4.74 | $7,832 | 20 | 10.910 | $85,452 |
| | Disinfection O&M | Flow Rate (mgd) | 4.74 | $41,490 | 20 | 10.910 | $452,650 |
| | Odor Control O&M | Capacity (cfm) | 750.00 | $2,625 | 20 | 10.910 | $28,639 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,938 |
| | | | **Total Annual O&M** | **$106,000** | | **Total PW O&M** | **$1,166,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.21 | $56,650 | 20 | 10.910 | $618,044 |
| | HREP O&M | Flow Rate (mgd) | 4.74 | $58,157 | 20 | 10.910 | $634,490 |
| | Screening O&M | Flow Rate (mgd) | 4.74 | $7,832 | 20 | 10.910 | $85,452 |
| | Disinfection O&M | Flow Rate (mgd) | 5.21 | $43,970 | 20 | 10.910 | $479,710 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,382 |
| | | | **Total Annual O&M** | **$167,000** | | **Total PW O&M** | **$1,839,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.21 | $56,650 | 20 | 10.910 | $618,044 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.74 | $533 | 20 | 10.910 | $5,817 |
| | Screening O&M | Flow Rate (mgd) | 4.74 | $7,832 | 20 | 10.910 | $85,452 |
| | Disinfection O&M | Flow Rate (mgd) | 5.21 | $43,970 | 20 | 10.910 | $479,710 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,056 |
| | | | **Total Annual O&M** | **$109,000** | | **Total PW O&M** | **$1,201,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.74 | $53,155 | 20 | 10.910 | $579,916 |
| | Screening O&M | Flow Rate (mgd) | 4.74 | $7,832 | 20 | 10.910 | $85,452 |
| | Disinfection O&M | Flow Rate (mgd) | 4.74 | $41,490 | 20 | 10.910 | $452,650 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,775 |
| | | | **Total Annual O&M** | **$103,000** | | **Total PW O&M** | **$1,133,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.26 | $41,391 | 20 | 10.910 | $451,568 |
| | Tank O&M | No. Events / Yr | 79 | $48,750 | 50 | 14.484 | $706,077 |
| | | Const Cost ($) | $85,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,708 | 20 | 10.910 | $84,090 |
| | Odor Control O&M | Capacity (cfm) | 140 | $490 | 20 | 10.910 | $5,346 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,456 |
| | | | **Total Annual O&M** | **$99,000** | | **Total PW O&M** | **$1,257,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.11 | $4,285 | 20 | 10.910 | $46,749 |
| | Tank O&M | No. Events / Yr | 79 | $51,665 | 50 | 14.484 | $748,296 |
| | | Const Cost ($) | $1,251,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,708 | 20 | 10.910 | $84,090 |
| | Odor Control O&M | Capacity (cfm) | 1,350 | $4,725 | 20 | 10.910 | $51,549 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,385 |
| | | | **Total Annual O&M** | **$69,000** | | **Total PW O&M** | **$934,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.26 | $41,391 | 20 | 10.910 | $451,568 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.26 | $367 | 50 | 14.484 | $5,311 |
| | Screening O&M | Flow Rate (mgd) | 3.26 | $7,708 | 20 | 10.910 | $84,090 |
| | Disinfection O&M | Flow Rate (mgd) | 3.26 | $33,028 | 20 | 10.910 | $360,328 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,675 |
| | | | **Total Annual O&M** | **$85,000** | | **Total PW O&M** | **$935,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.59 | $44,112 | 20 | 10.910 | $481,258 |
| | HREP O&M | Flow Rate (mgd) | 3.26 | $46,663 | 20 | 10.910 | $509,088 |
| | Screening O&M | Flow Rate (mgd) | 3.26 | $7,708 | 20 | 10.910 | $84,090 |
| | Disinfection O&M | Flow Rate (mgd) | 3.59 | $35,002 | 20 | 10.910 | $381,869 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,424 |
| | | | **Total Annual O&M** | **$134,000** | | **Total PW O&M** | **$1,474,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.59 | $44,112 | 20 | 10.910 | $481,258 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.26 | $367 | 20 | 10.910 | $4,000 |
| | Screening O&M | Flow Rate (mgd) | 3.26 | $7,708 | 20 | 10.910 | $84,090 |
| | Disinfection O&M | Flow Rate (mgd) | 3.59 | $35,002 | 20 | 10.910 | $381,869 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,745 |
| | | | **Total Annual O&M** | **$88,000** | | **Total PW O&M** | **$962,000** |

| CSO 068H002 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.26 | $41,391 | 20 | 10.910 | $451,568 |
| | Screening O&M | Flow Rate (mgd) | 3.26 | $7,708 | 20 | 10.910 | $84,090 |
| | Disinfection O&M | Flow Rate (mgd) | 3.26 | $33,028 | 20 | 10.910 | $360,328 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,533 |
| | | | **Total Annual O&M** | **$83,000** | | **Total PW O&M** | **$908,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.5 | $5,470,000 | $0 |
| 1 | $5.5 | $5,470,000 | $0 |
| 2 | $5.5 | $5,470,000 | $0 |
| 4 | $5.5 | $5,470,000 | $0 |
| 6 | $5.5 | $5,470,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.2 | $5,796,000 | $1,376,000 |
| 1 | $4.8 | $3,682,000 | $1,096,000 |
| 2 | $4.0 | $3,025,000 | $1,008,000 |
| 4 | $3.6 | $2,664,000 | $956,000 |
| 6 | $3.4 | $2,464,000 | $934,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $8.6 | $6,263,000 | $2,372,000 |
| 1 | $5.9 | $4,134,000 | $1,772,000 |
| 2 | $5.1 | $3,510,000 | $1,543,000 |
| 4 | $4.5 | $3,095,000 | $1,389,000 |
| 6 | $4.0 | $2,762,000 | $1,257,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.0 | $8,988,000 | $3,050,000 |
| 1 | $6.6 | $4,717,000 | $1,868,000 |
| 2 | $5.6 | $4,127,000 | $1,470,000 |
| 4 | $4.9 | $3,712,000 | $1,201,000 |
| 6 | $4.3 | $3,349,000 | $962,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $15.9 | $11,586,000 | $4,342,000 |
| 1 | $10.5 | $7,683,000 | $2,842,000 |
| 2 | $8.8 | $6,514,000 | $2,245,000 |
| 4 | $7.6 | $5,749,000 | $1,839,000 |
| 6 | $6.6 | $5,104,000 | $1,474,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $25.7 | $22,877,000 | $2,842,000 |
| 1 | $22.7 | $20,860,000 | $1,829,000 |
| 2 | $21.7 | $20,258,000 | $1,436,000 |
| 4 | $21.0 | $19,837,000 | $1,166,000 |
| 6 | $20.4 | $19,488,000 | $935,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $9.7 | $6,961,000 | $2,705,000 |
| 1 | $6.6 | $4,811,000 | $1,758,000 |
| 2 | $5.5 | $4,155,000 | $1,385,000 |
| 4 | $4.8 | $3,710,000 | $1,133,000 |
| 6 | $4.2 | $3,323,000 | $908,000 |

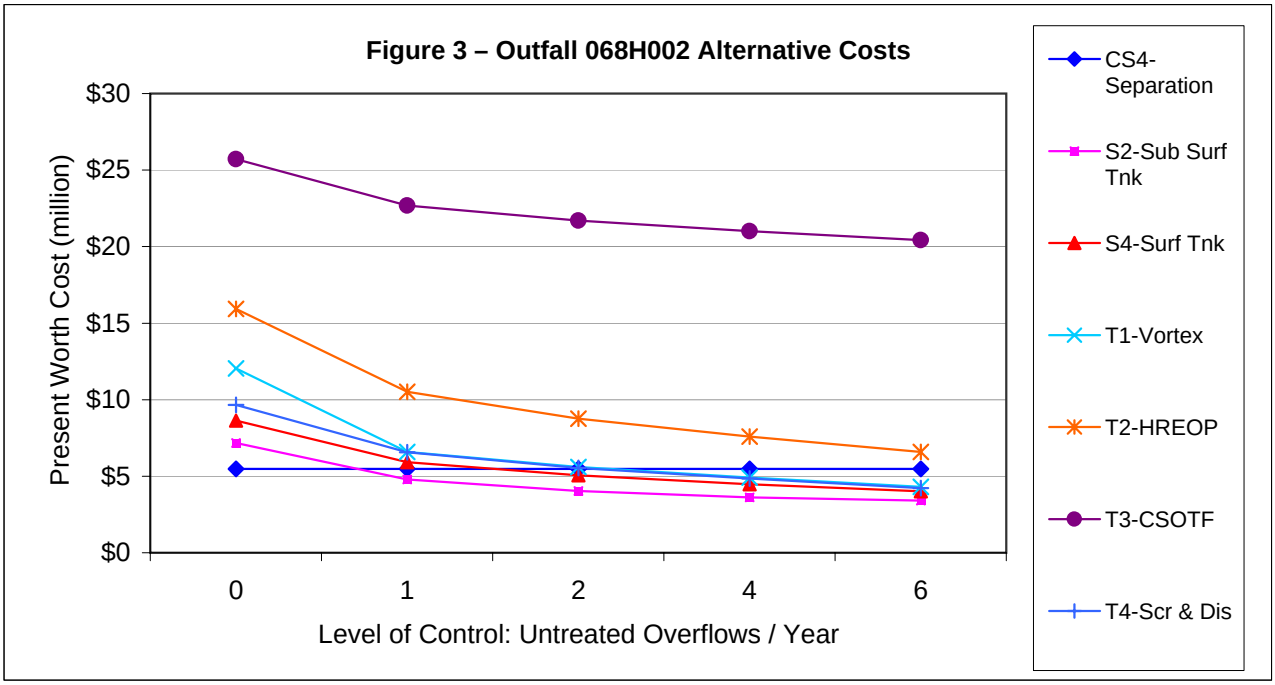


Figure 3 – Outfall 068H002 Alternative Costs
$30
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 068H002 |
| **Location Name** | Oakwood Road |
| **Model ID** | DC 068H002-W.Y |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Chartiers Creek and Bells Run |
| **Stream of Discharge** | Chartiers Creek |
| **NPDES Permit Number** | 068H002 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 79 |
| Peak Volume: | 89,067 $ft^3$ |
| | 0.67 MG |
| Total Volume: | 470,227 $ft^3$ |
| | 3.52 MG |
| Peak Rate: | 30.32 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 0:17 | 3529 | 1/5/2005 14:30 | 89067.11 | 666.266 | 0 | 1.97 | 20 |
| 6/11/2005 17:15 | 69 | 6/11/2005 17:45 | 40921.47 | 306.113 | 1 | 30.32 | 0 |
| 8/20/2005 18:15 | 95 | 8/20/2005 18:30 | 26112.29 | 195.333 | 2 | 15.16 | 1 |
| 1/11/2005 7:45 | 1236 | 1/12/2005 1:15 | 18593.37 | 139.088 | 3 | 1.36 | 27 |
| 4/23/2005 3:15 | 530 | 4/23/2005 3:45 | 18471.26 | 138.174 | 4 | 9.24 | 3 |
| 10/24/2005 13:16 | 1756 | 10/25/2005 2:30 | 16677.14 | 124.753 | 5 | 1.13 | 33 |
| 11/29/2005 1:42 | 742 | 11/29/2005 7:00 | 14620.17 | 109.366 | 6 | 1.91 | 23 |
| 2/14/2005 5:08 | 1047 | 2/14/2005 19:45 | 14587.64 | 109.123 | 7 | 0.65 | 51 |
| 11/14/2005 21:45 | 528 | 11/15/2005 1:30 | 14471.39 | 108.253 | 8 | 2.30 | 17 |
| 5/13/2005 22:30 | 678 | 5/13/2005 23:25 | 14420.41 | 107.872 | 9 | 3.17 | 12 |
| 1/3/2005 8:05 | 974 | 1/3/2005 13:45 | 12972.39 | 97.040 | 10 | 0.79 | 45 |
| 3/28/2005 8:56 | 714 | 3/28/2005 20:00 | 12563.87 | 93.984 | 11 | 1.10 | 35 |
| 4/1/2005 19:16 | 1338 | 4/2/2005 6:30 | 12218.99 | 91.404 | 12 | 1.17 | 32 |
| 7/5/2005 16:15 | 107 | 7/5/2005 16:25 | 10929.05 | 81.755 | 13 | 5.04 | 6 |
| 5/14/2005 16:00 | 483 | 5/14/2005 16:15 | 10207.06 | 76.354 | 14 | 10.25 | 2 |
| 7/26/2005 19:30 | 49 | 7/26/2005 20:00 | 10044.11 | 75.135 | 15 | 7.33 | 4 |
| 7/15/2005 17:31 | 64 | 7/15/2005 18:10 | 9755.87 | 72.979 | 16 | 4.66 | 7 |
| 9/29/2005 5:10 | 54 | 9/29/2005 5:45 | 7510.34 | 56.181 | 17 | 5.85 | 5 |
| 8/29/2005 9:00 | 393 | 8/29/2005 9:15 | 7111.43 | 53.197 | 18 | 4.58 | 8 |
| 1/8/2005 1:05 | 502 | 1/8/2005 5:30 | 6649.19 | 49.739 | 19 | 1.24 | 29 |
| 1/13/2005 22:42 | 275 | 1/14/2005 2:00 | 6334.75 | 47.387 | 20 | 0.88 | 42 |
| 11/9/2005 19:15 | 36 | 11/9/2005 19:30 | 5660.77 | 42.345 | 21 | 4.02 | 9 |
| 5/11/2005 22:30 | 94 | 5/11/2005 22:45 | 5192.65 | 38.844 | 22 | 3.09 | 13 |
| 7/21/2005 14:17 | 77 | 7/21/2005 14:45 | 5038.42 | 37.690 | 23 | 3.47 | 11 |
| 12/15/2005 10:48 | 568 | 12/15/2005 13:55 | 4599.16 | 34.404 | 24 | 1.46 | 25 |
| 5/28/2005 8:15 | 92 | 5/28/2005 9:10 | 4113.83 | 30.774 | 25 | 1.08 | 36 |
| 2/20/2005 15:36 | 673 | 2/20/2005 20:00 | 3957.13 | 29.601 | 26 | 1.20 | 30 |
| 7/17/2005 16:00 | 39 | 7/17/2005 16:15 | 3798.75 | 28.417 | 27 | 3.52 | 10 |
| 10/21/2005 18:40 | 189 | 10/21/2005 19:00 | 3273.11 | 24.485 | 28 | 0.86 | 43 |
| 3/23/2005 11:45 | 139 | 3/23/2005 12:30 | 3181.05 | 23.796 | 29 | 0.89 | 41 |
| 10/7/2005 7:21 | 343 | 10/7/2005 10:45 | 3105.38 | 23.230 | 30 | 0.91 | 40 |
| 2/9/2005 15:01 | 122 | 2/9/2005 16:45 | 3035.11 | 22.704 | 31 | 1.18 | 31 |
| 4/30/2005 4:25 | 144 | 4/30/2005 4:30 | 2720.98 | 20.354 | 32 | 0.83 | 44 |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 5/30/2005 19:16 | 48 | 5/30/2005 19:30 | 2630.43 | 19.677 | 33 | 2.58 | 14 |
| 10/22/2005 15:37 | 147 | 10/22/2005 16:30 | 2297.72 | 17.188 | 34 | 0.72 | 48 |
| 3/23/2005 2:30 | 182 | 3/23/2005 4:15 | 2235.33 | 16.721 | 35 | 0.57 | 55 |
| 9/26/2005 7:39 | 175 | 9/26/2005 9:30 | 2123.80 | 15.887 | 36 | 1.02 | 38 |
| 11/1/2005 14:46 | 169 | 11/1/2005 16:25 | 2052.81 | 15.356 | 37 | 0.47 | 57 |
| 6/14/2005 18:47 | 52 | 6/14/2005 19:00 | 2039.74 | 15.258 | 38 | 2.04 | 19 |
| 4/20/2005 19:35 | 224 | 4/20/2005 21:25 | 2007.33 | 15.016 | 39 | 1.55 | 24 |
| 11/9/2005 4:15 | 30 | 11/9/2005 4:30 | 1900.02 | 14.213 | 40 | 2.07 | 18 |
| 4/22/2005 15:56 | 172 | 4/22/2005 16:15 | 1784.99 | 13.353 | 41 | 0.64 | 52 |
| 7/12/2005 19:40 | 39 | 7/12/2005 20:00 | 1784.36 | 13.348 | 42 | 1.38 | 26 |
| 5/23/2005 16:16 | 63 | 5/23/2005 16:30 | 1766.28 | 13.213 | 43 | 2.48 | 16 |
| 5/20/2005 6:38 | 235 | 5/20/2005 7:40 | 1698.10 | 12.703 | 44 | 0.47 | 58 |
| 8/27/2005 15:02 | 33 | 8/27/2005 15:15 | 1575.45 | 11.785 | 45 | 1.92 | 22 |
| 7/25/2005 13:16 | 19 | 7/25/2005 13:30 | 1526.81 | 11.421 | 46 | 2.50 | 15 |
| 12/25/2005 10:41 | 158 | 12/25/2005 12:45 | 1478.68 | 11.061 | 47 | 0.41 | 62 |
| 5/7/2005 12:05 | 89 | 5/7/2005 13:30 | 1461.96 | 10.936 | 48 | 0.97 | 39 |
| 2/16/2005 7:00 | 79 | 2/16/2005 7:15 | 1413.18 | 10.571 | 49 | 0.76 | 47 |
| 4/26/2005 23:16 | 97 | 4/27/2005 0:30 | 1406.94 | 10.525 | 50 | 0.61 | 54 |
| 11/16/2005 4:05 | 192 | 11/16/2005 4:15 | 1313.87 | 9.828 | 51 | 1.07 | 37 |
| 3/27/2005 16:45 | 79 | 3/27/2005 17:00 | 1208.17 | 9.038 | 52 | 0.68 | 49 |
| 10/21/2005 7:15 | 34 | 10/21/2005 7:30 | 1204.99 | 9.014 | 53 | 1.11 | 34 |
| 10/22/2005 6:45 | 49 | 10/22/2005 7:00 | 1180.78 | 8.833 | 54 | 0.68 | 50 |
| 5/28/2005 17:01 | 93 | 5/28/2005 18:15 | 1082.18 | 8.095 | 55 | 0.42 | 61 |
| 8/26/2005 20:50 | 29 | 8/26/2005 21:00 | 1005.86 | 7.524 | 56 | 1.28 | 28 |
| 4/3/2005 1:02 | 301 | 4/3/2005 2:00 | 933.02 | 6.979 | 57 | 0.25 | 66 |
| 6/28/2005 18:02 | 62 | 6/28/2005 18:15 | 919.61 | 6.879 | 58 | 1.96 | 21 |
| 6/3/2005 8:35 | 44 | 6/3/2005 9:00 | 871.46 | 6.519 | 59 | 0.48 | 56 |
| 8/8/2005 8:43 | 27 | 8/8/2005 9:00 | 732.68 | 5.481 | 60 | 0.78 | 46 |
| 8/5/2005 10:58 | 36 | 8/5/2005 11:25 | 641.97 | 4.802 | 61 | 0.43 | 60 |
| 1/30/2005 11:11 | 113 | 1/30/2005 13:00 | 585.40 | 4.379 | 62 | 0.29 | 65 |
| 3/20/2005 3:40 | 234 | 3/20/2005 7:15 | 518.54 | 3.879 | 63 | 0.40 | 63 |
| 4/24/2005 15:17 | 811 | 4/24/2005 23:30 | 441.16 | 3.300 | 64 | 0.11 | 70 |
| 9/16/2005 21:34 | 15 | 9/16/2005 21:45 | 379.62 | 2.840 | 65 | 0.63 | 53 |
| 11/8/2005 14:26 | 38 | 11/8/2005 14:35 | 377.79 | 2.826 | 66 | 0.23 | 67 |
| 6/16/2005 12:46 | 18 | 6/16/2005 13:00 | 293.52 | 2.196 | 67 | 0.45 | 59 |
| 3/7/2005 22:17 | 136 | 3/7/2005 23:45 | 253.00 | 1.893 | 68 | 0.08 | 73 |
| 12/26/2005 5:09 | 337 | 12/26/2005 6:15 | 243.66 | 1.823 | 69 | 0.07 | 75 |
| 11/24/2005 7:51 | 219 | 11/24/2005 8:00 | 226.33 | 1.693 | 70 | 0.12 | 69 |
| 11/23/2005 19:17 | 60 | 11/23/2005 20:00 | 192.26 | 1.438 | 71 | 0.09 | 72 |
| 6/17/2005 1:25 | 54 | 6/17/2005 1:30 | 191.14 | 1.430 | 72 | 0.32 | 64 |
| 1/22/2005 11:02 | 17 | 1/22/2005 11:15 | 87.30 | 0.653 | 73 | 0.12 | 68 |
| 10/24/2005 2:19 | 43 | 10/24/2005 3:00 | 81.31 | 0.608 | 74 | 0.05 | 78 |
| 12/4/2005 6:33 | 14 | 12/4/2005 6:45 | 63.24 | 0.473 | 75 | 0.10 | 71 |
| 4/3/2005 13:18 | 15 | 4/3/2005 13:30 | 48.20 | 0.361 | 76 | 0.07 | 76 |
| 4/24/2005 1:35 | 12 | 4/24/2005 1:45 | 31.50 | 0.236 | 77 | 0.05 | 77 |
| 2/8/2005 5:56 | 6 | 2/8/2005 6:00 | 18.80 | 0.141 | 78 | 0.07 | 74 |

## Region 1

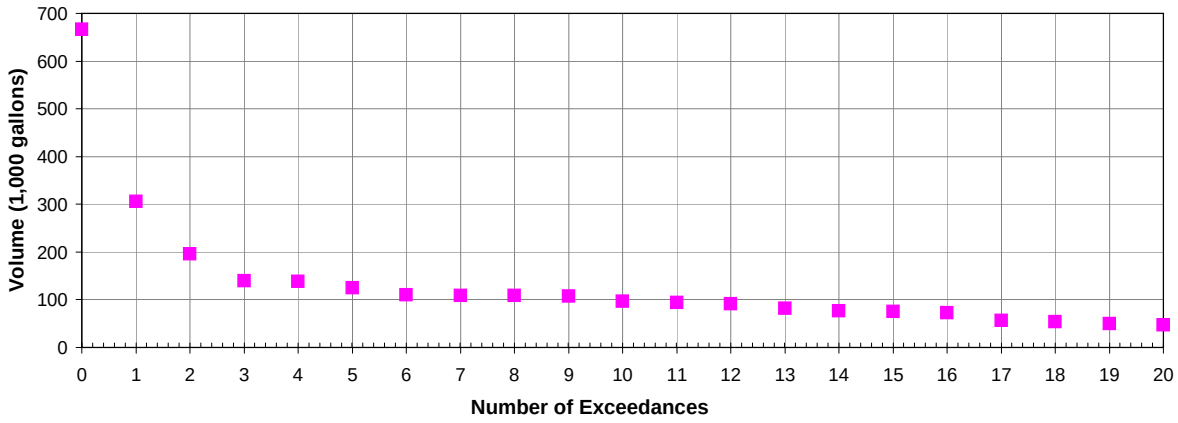
### PWSA CSO DISCHARGES
### for "Typical Year - 2005"
### Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 068H002 |
| **Location Name** | Oakwood Road |
| **Model ID** | DC 068H002-W.Y |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Chartiers Creek and Bells Run |
| **Stream of Discharge** | Chartiers Creek |
| **NPDES Permit Number** | 068H002 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

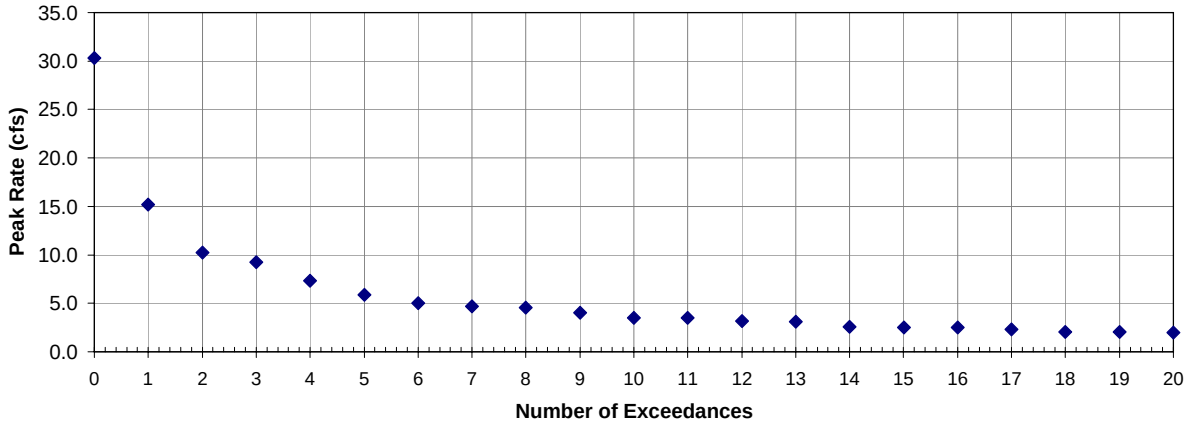
**Results Summary**

| | |
|---|---|
| Number of Events: | 79 |
| Peak Volume: | 89,067 $ft^3$ |
| | 0.67 MG |
| Total Volume: | 470,227 $ft^3$ |
| | 3.52 MG |
| Peak Rate: | 30.32 cfs |

### Figure 1 - Outfall 068H002 CSO Volume




### Figure 2 - Outfall 068H002 CSO Peak Flow Rate



## D.24.4 BELLS RUN SEWERSHED – OAKWOOD ROAD - NPDES #068H002

### Description of Outfall

Outfall 068H002 conveys overflows from the PWSA diversion chamber 068H002 to Bells Run, Chartiers Creek, and ultimately into the Ohio River. The outfall is located along Bells Run, under the Oakwood Road bridge. The Bells Run Sewershed consists of 726 acres of mostly combined sewers. The 068H002 Sewershed consists of 36 acres, or approximately 3.7% of the total service area. The Bells Run Sewershed is comprised of approximately 301 manholes and 66,326 linear feet (12.6 miles) of sewer up to 66 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 068H002 typically experiences 79 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 068H002 approximately 0.67 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 068H002 is approximately 30.32 CFS. *Figure 1 – Outfall 068H002 CSO Volume* and *Figure 2 – Outfall 068H002 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

DRAFT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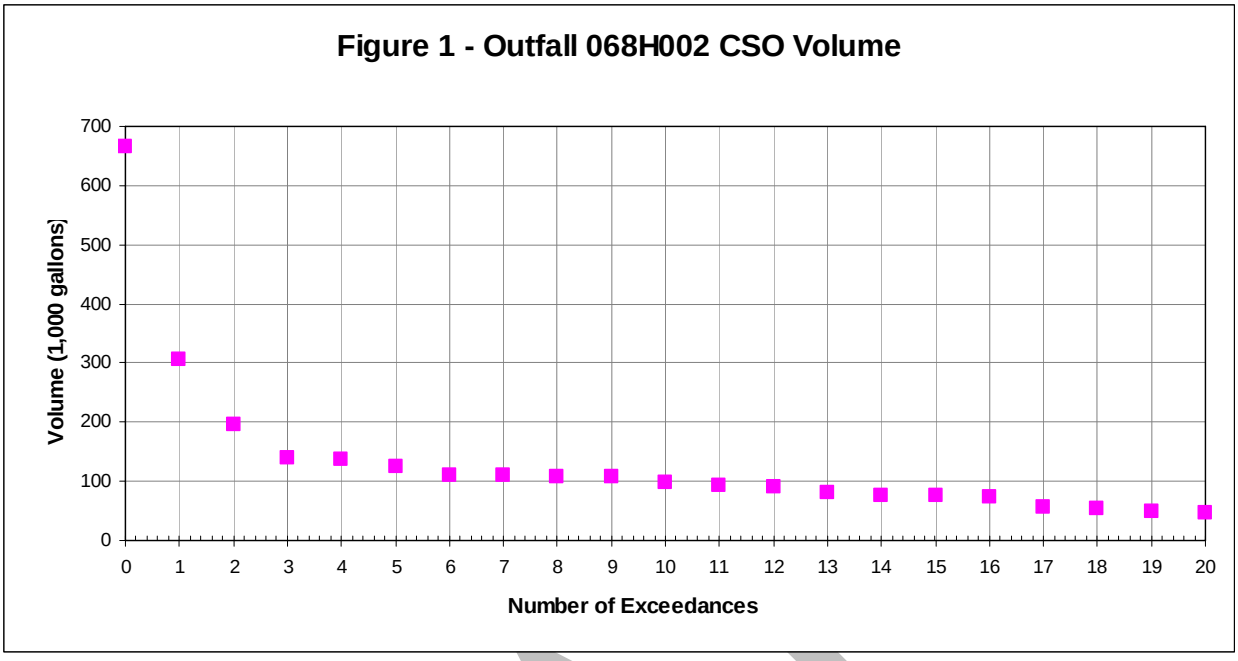


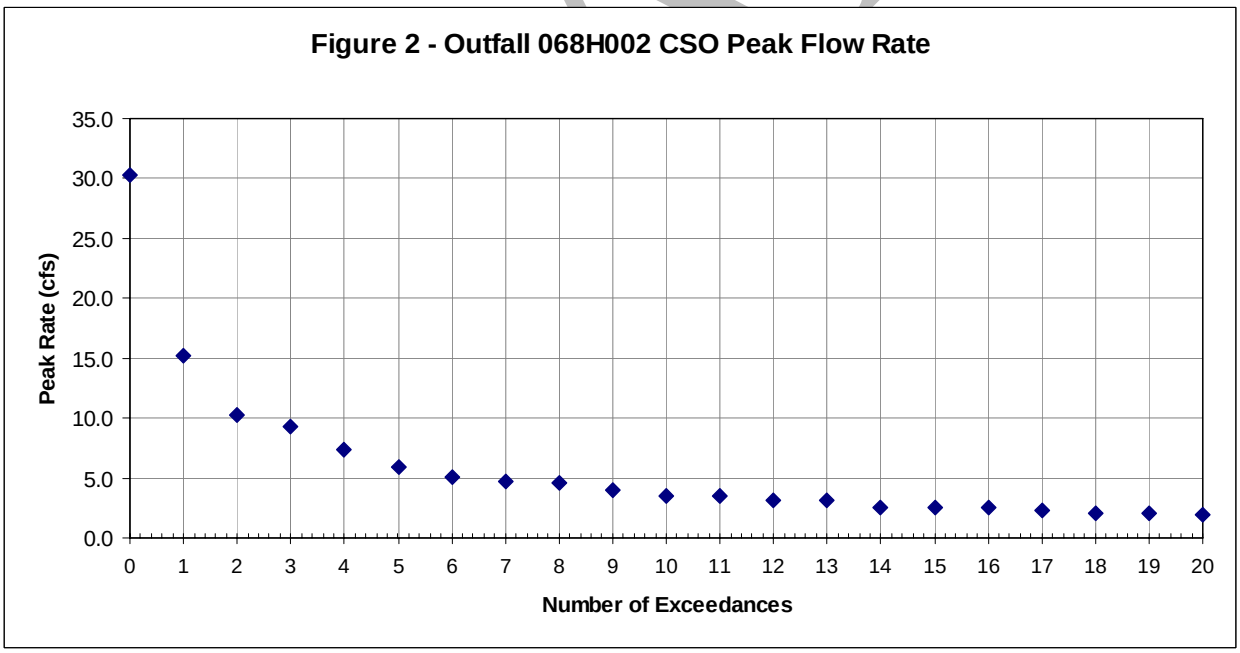


Spaces appears to be limited for storage or treatment facilities. Limited space appears to be available adjacent to Oakwood Road, adjacent to the outfall. The site is generally bounded by Oakwood Road to the west and private development and steep slopes to the north, south and east.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 068H002. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-068H002: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-068H002: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-068H002: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-068H002: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-068H002: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-068H002: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-068H002: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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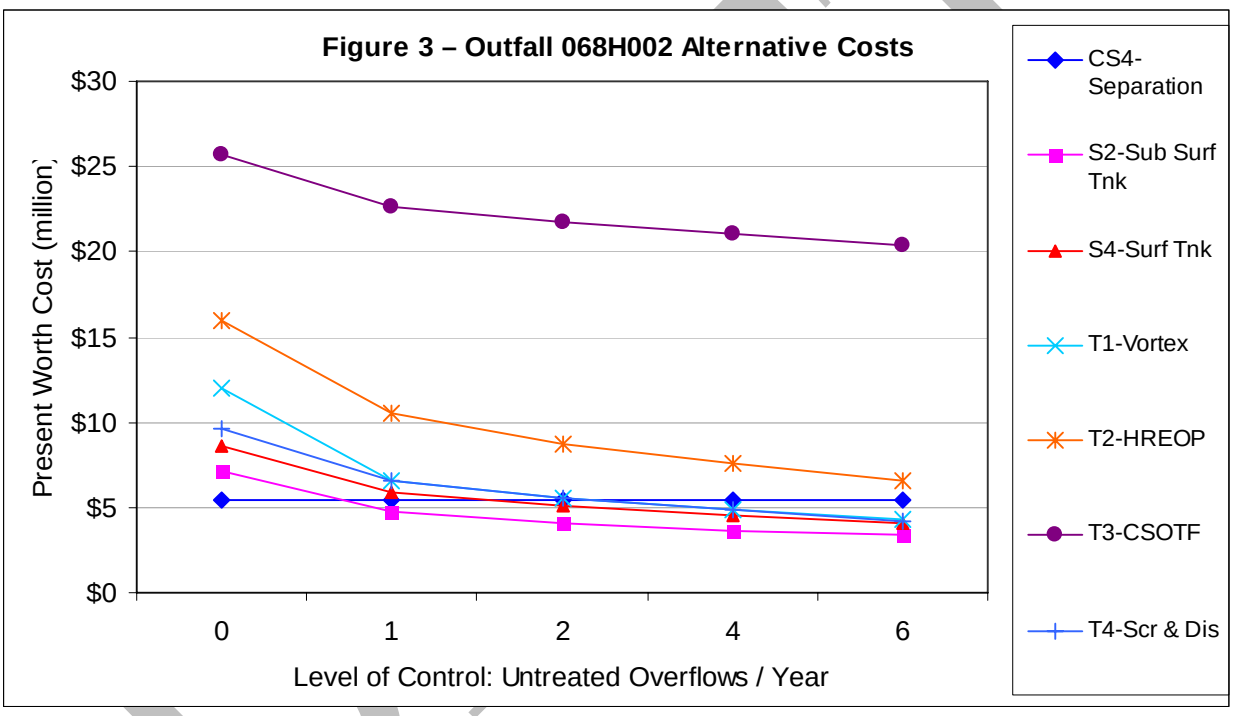
**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 068H002 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.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**Recommendations**

Based upon the above, for control level 0, it is recommended that Alternative CS4-068H002: Sewer Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-068H002: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the PWSA diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

For control levels 1 through 6, a subsurface storage facility was the highest rank alternative. It appears that space is limited adjacent to Oakwood Road to construct said facility. A small footprint is required to control CSOs at levels 1 through 6.

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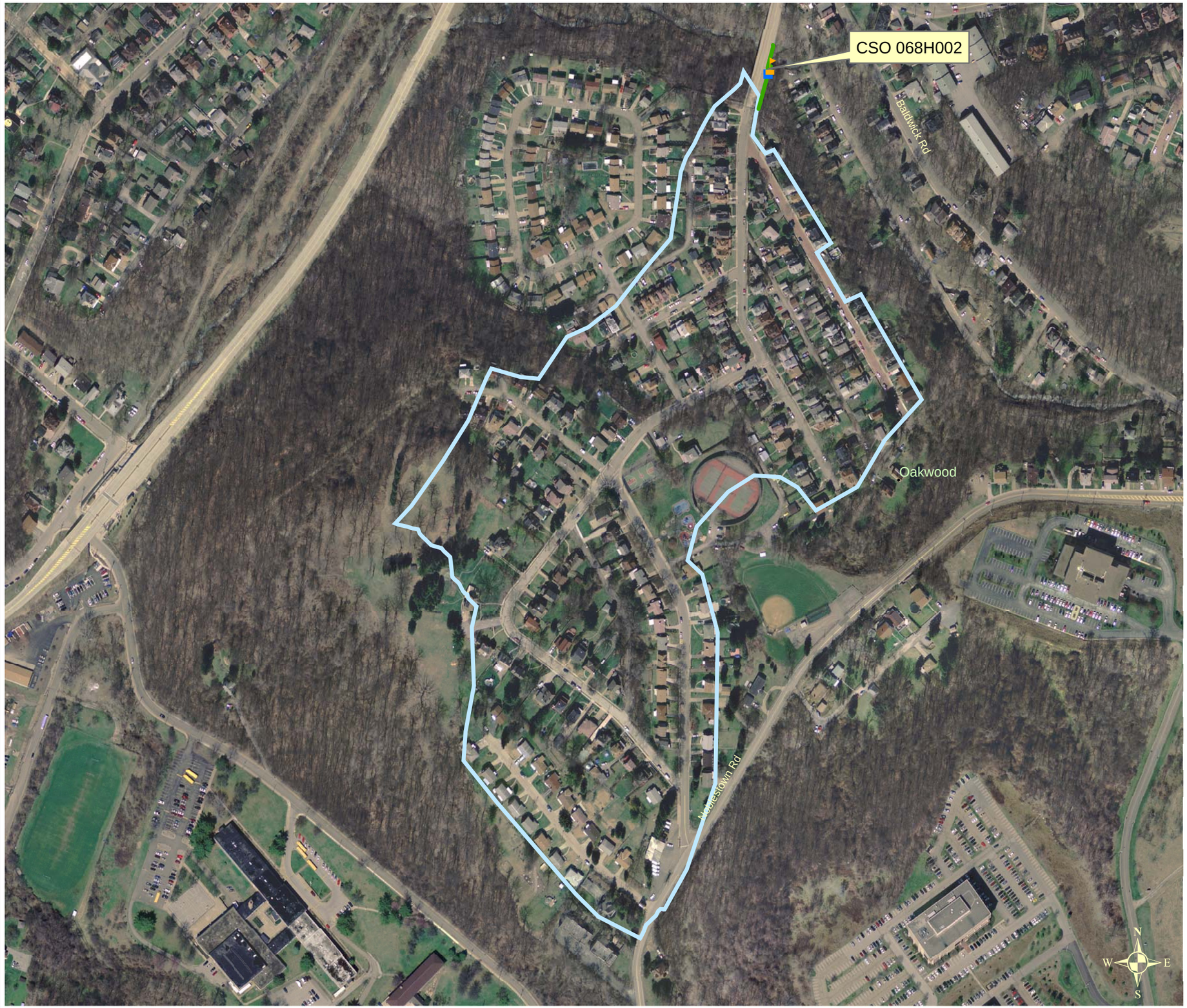


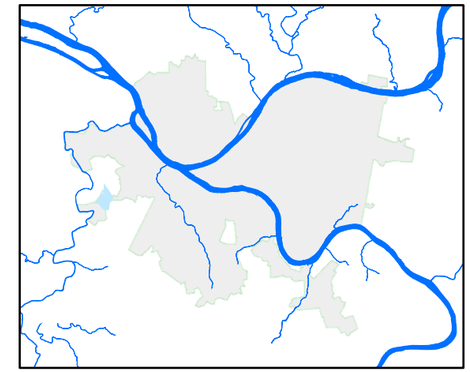

## Area Overview

## Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

300 0 300 Feet

# Attachment 1
# CSO 068H002
# Tributary Area Map
# Bells Run
# Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

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Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | A relief sewer will not be evaluated. |
| Sewer separation | Y | Sewer separation within the 36 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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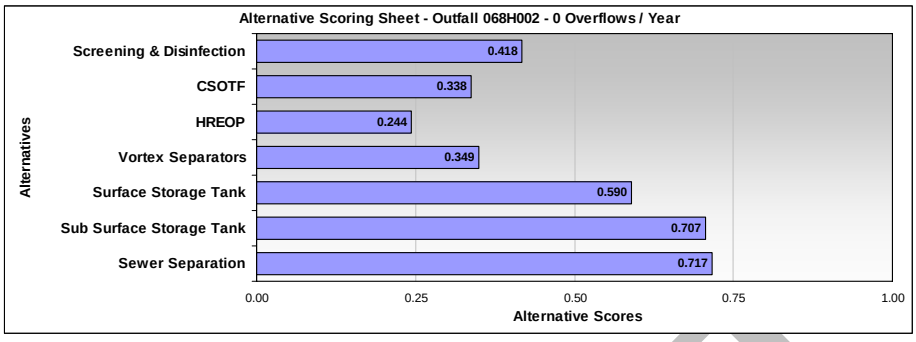
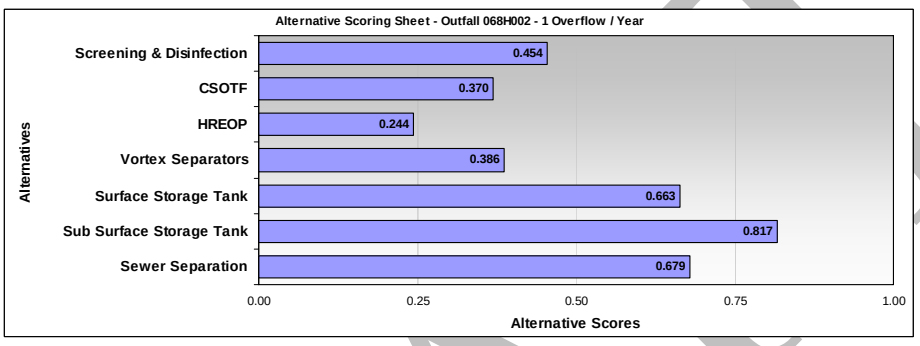
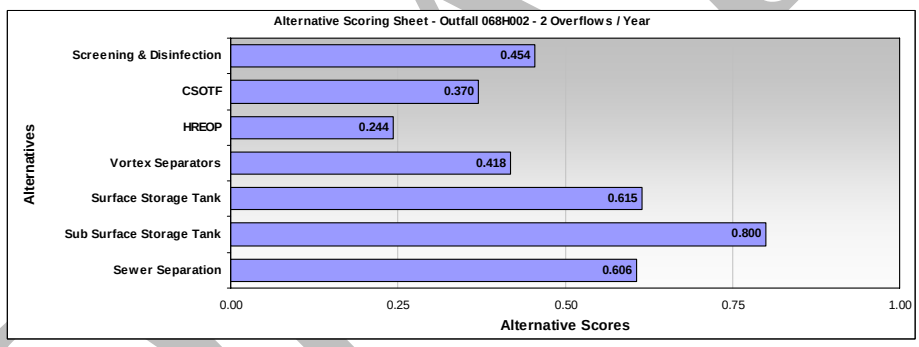
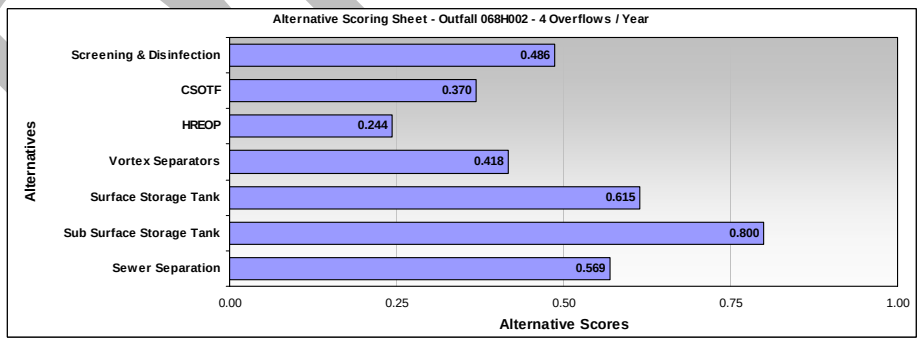
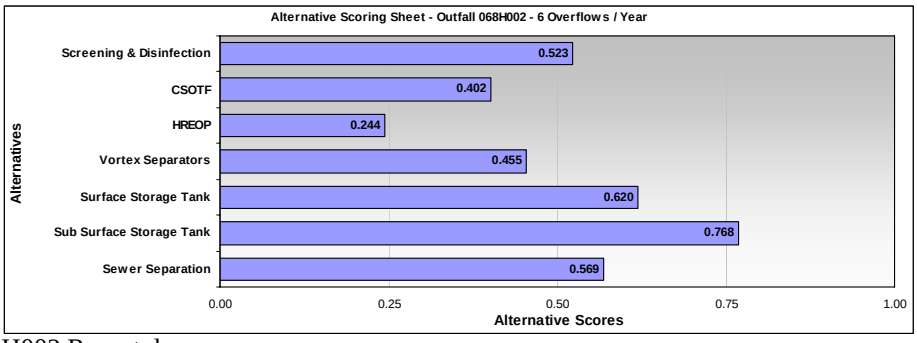
# Attachment 3 – Alternative Scoring Sheet

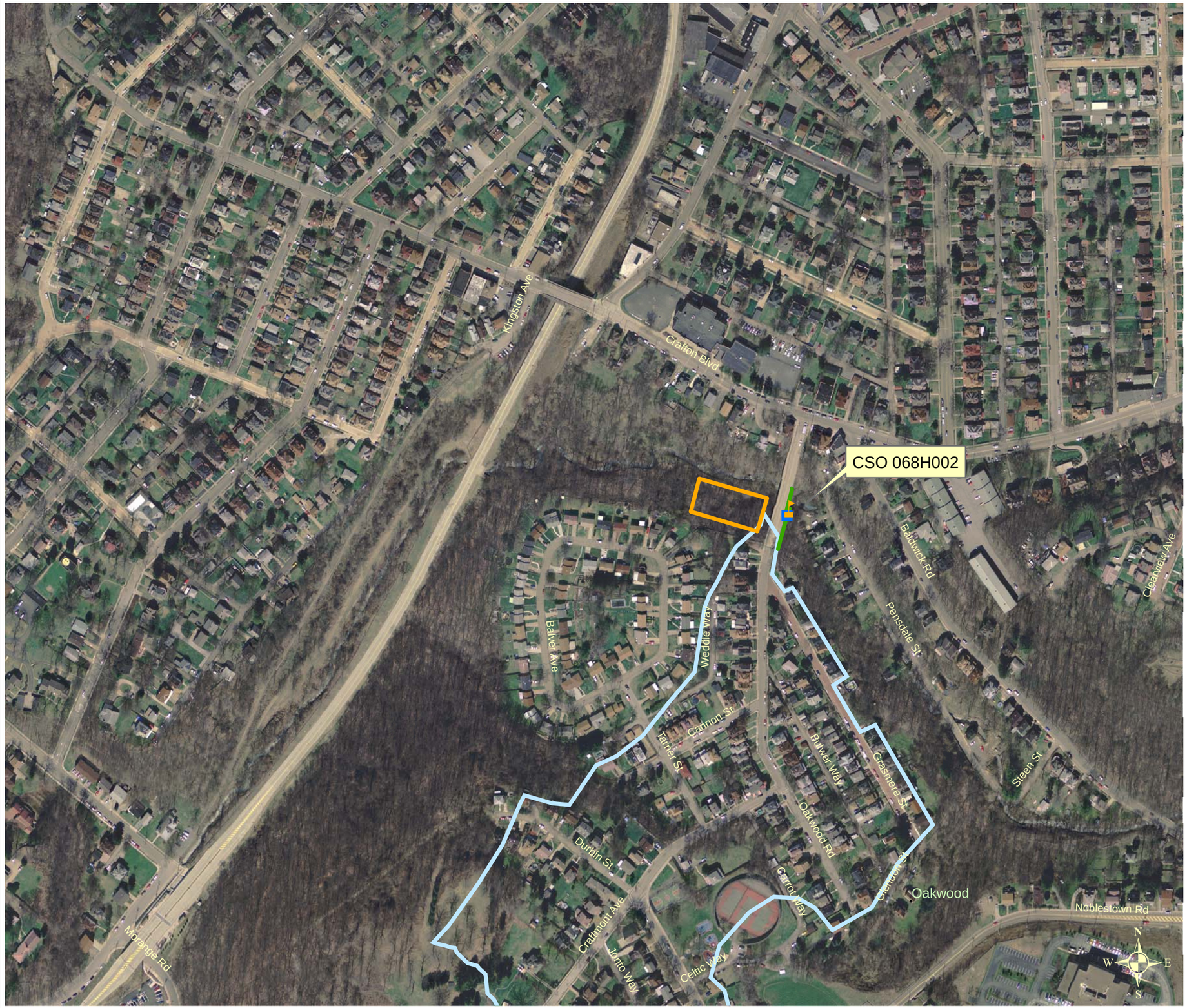


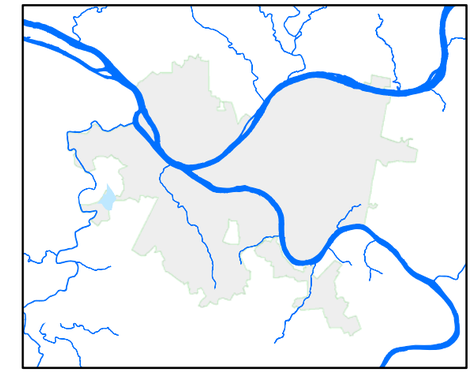





Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

0 290 580 Feet

# Attachment 4
# CSO 068H002
# Facilities Boundary Map
# Bells Run
# Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 2 | 3 | 4 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 4 | 4 | 4 | 4 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 1 | 2 | 3 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 1 | 2 | 3 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 1 | 1 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.680** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.732** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.659** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.679** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.752** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.423** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.459** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.528** |

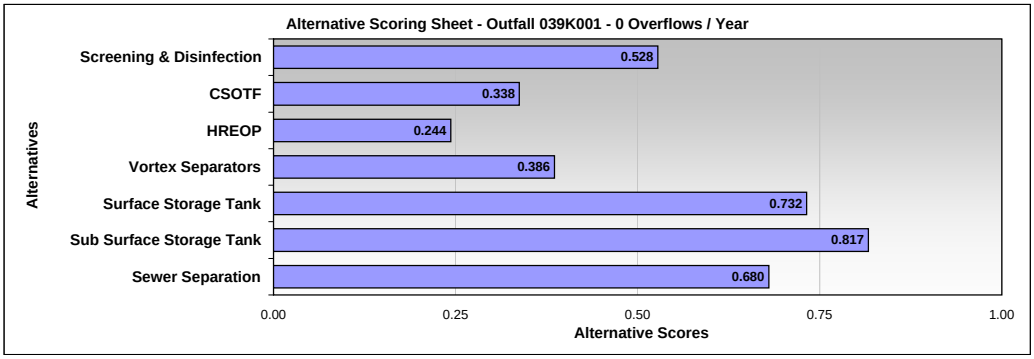
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

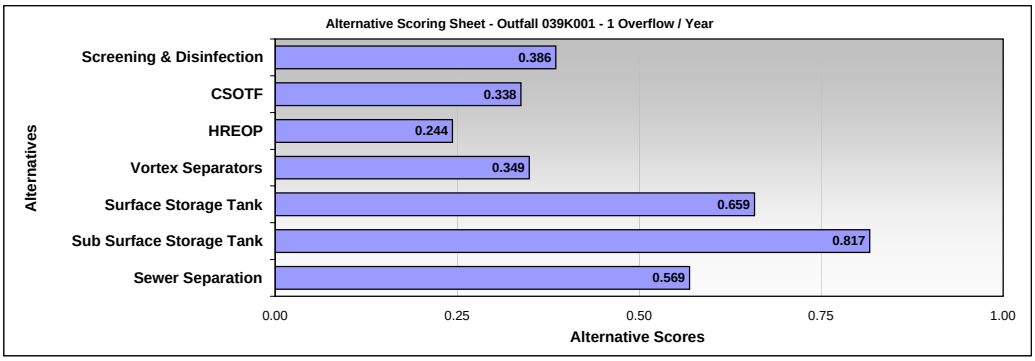
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.422** |

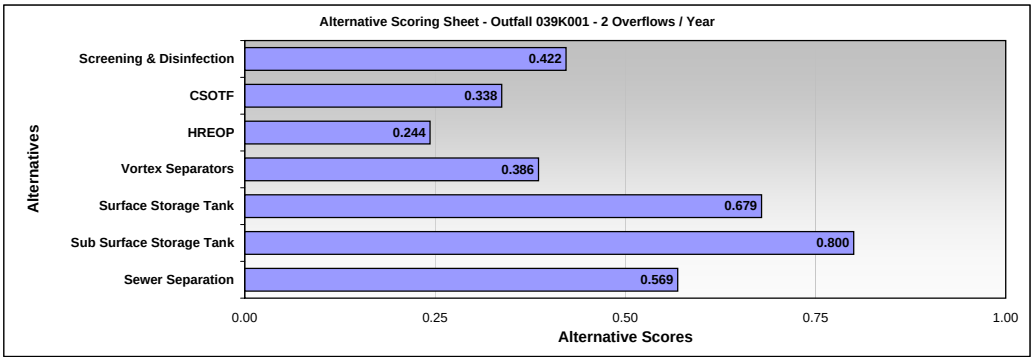
Total Score

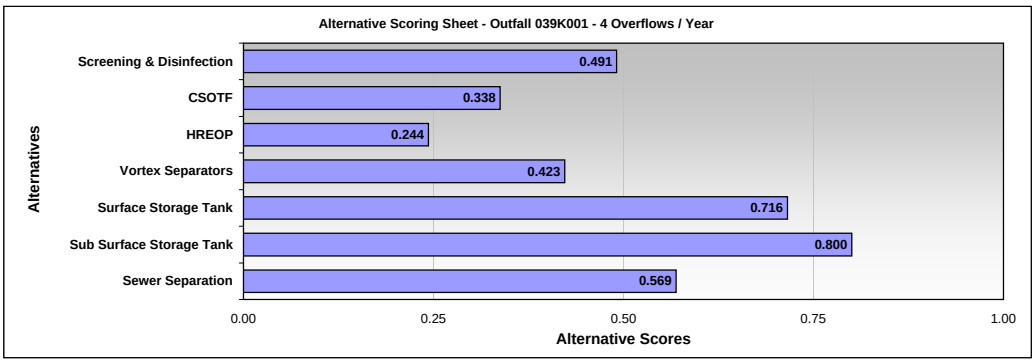
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.491** |

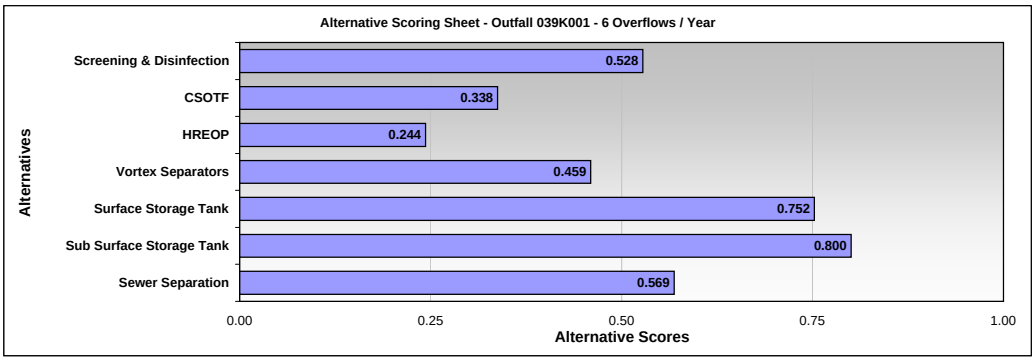
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.528** |


Alternative Scoring Sheet - Outfall 039K001 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.528
0.338
0.244
0.386
0.732
0.817
0.680
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 039K001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.659
0.817
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 039K001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.422
0.338
0.244
0.386
0.679
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 039K001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.491
0.338
0.244
0.423
0.716
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 039K001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.528
0.338
0.244
0.459
0.752
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 321 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **48,150,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 139,828 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **280,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **48,469,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 6.97 | 931,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 8.19 | 1,095,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 332 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 222 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 8.27 | 1,105,560 | **Sufficient Volume** |
| Tank Area (SF) | | 74,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **7,820,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 178.87 | 276.77 | = Peak Rate |
| Force Main Diameter (In) | | 92 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,474,000** | **$ 116,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 276.77 | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **268,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,643,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 8,220 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **477,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 178.87 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 123,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **246,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **41,134,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 6.97 | 931,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 8.19 | 1,095,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 332 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 222 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 8.27 | 1,105,560 | **Sufficient Volume** |
| Tank Area (SF) | | 74,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **22,364,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.97 | 10.78 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 18 | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,473,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 276.77 | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **268,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,643,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 82,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,898,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 178.87 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 123,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **246,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **37,008,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 178.87 | 276.77 | Ref: CSO Statistics | |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters | |
| Diameter (Ft), 35-ft max | | 35 | **Diameter OK** | Input by Engineer | |
| Number of Units Required @ Given Loading Rate | | 19 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **7,181,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters | |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters | |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** | |
| Dewatering Pumping Rate (MGD / CFS) | | 196.76 | 304.45 | = Peak Vol / DW Time x % Req Pump | |
| Force Main Diameter (In) | | 96 | | DW Pump Rate / 2 FPS | |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** | |
| Force Main Length (Ft) | | 100 | | Input by Engineer | |
| **Construction Cost (PS / Force Main)** | **$** | **25,656,000** | **$ 123,000** | | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 276.77 | | Ref: Technical Parameters | |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" | |
| Length (Ft) | | 100 | | Input by Engineer | |
| Depth (Ft) | | 20 | | Input by Engineer | |
| **Construction Cost (Pipe)** | **$** | **268,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters | |
| Volume of Ventilated Space (CF) | | 548,000 | | = Required Storage Vol x 2, 15' SWD | |
| Odor Control Flow Rate (CFM) | | 27,400 | | = ACH x Volume / 60 | |
| **Construction Cost (Odor Control)** | **$** | **1,226,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** | |
| Peak Flow, into facility (MGD) | | 178.87 | | Ref: CSO Statistics | |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** | |
| Peak Flow (MGD) | | 196.76 | | Ref: Peak flow of PS | |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 219 | 105 | | |
| Passes / Detention (Min) | | 7 | **15.11** | Ref: Tech Param-15 min minimum | |
| | | | **OK Detn Time** | | |
| **Construction Cost (Disinfection)** | **$** | **2,612,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer | |
| Number Regulators | | 1 | | Input by Engineer | |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** | |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 186,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **372,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **46,431,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 178.87 | | 276.77 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 29,900 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 246 | | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 123 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 2.72 | | 363,096 | |
| **Construction Cost (CSOTF)** | **$** | **17,359,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 178.87 | | 276.77 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 92 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,474,000** | **$** | **116,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 276.77 | | | Ref: CSO Statistics |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **268,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 545,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 27,250 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **1,220,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 178.87 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 178.87 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 209 | | 100 | |
| Passes / Detention (Min) | | 7 | | 15.10 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **2,565,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 77,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **154,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **53,889,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 178.87 | | 276.77 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,110 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 66 | | **OK** | Input by Engineer |
| Width (Ft) | | 33 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **32,304,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 196.76 | | 304.45 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 96 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **25,656,000** | **$** | **123,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 276.77 | | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **268,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 52,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 2,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **194,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 178.87 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 196.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 219 | | 105 | Input by Engineer |
| Passes / Detention (Min) | | 7 | | **15.11** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,612,000 | $ | 3,922,000 | |
| **Construction Cost (Disinfection)** | **$** | **6,534,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 105,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **210,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **74,022,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 931,153 | CF |
| | 6.97 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 276.77 | CFS |
| | 178.87 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 178.87 | | 276.77 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,694,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 178.87 | | 276.77 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 92 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,474,000** | **$** | **116,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 276.77 | | | Ref: CSO Statistics |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **268,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 55,400 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 2,770 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **203,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 178.87 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 209 | | 100 | |
| Passes / Detention (Min) | | 7 | | **15.10** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,565,000 | $ | 3,642,000 | |
| **Construction Cost (Disinfection)** | **$** | **6,207,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 42,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **84,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **39,085,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 321 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **48,150,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 139,828 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **280,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **48,469,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 3.06 | | 409,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 3.60 | | 481,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 220 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 147 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 3.63 | | 485,100 | **Sufficient Volume** |
| Tank Area (SF) | 32,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **3,188,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 119.68 | | 185.18 | = Peak Rate |
| Force Main Diameter (In) | 75 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **16,252,000** | **$** | **92,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 185.18 | | | Ref: Technical Parameters |
| Diameter (In) | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 722,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,610 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **250,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 119.68 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **5,953,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 65,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **130,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **26,103,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 3.06 | | 409,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 3.60 | | 481,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 220 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 147 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 3.63 | | 485,100 | **Sufficient Volume** |
| Tank Area (SF) | 32,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **10,330,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 3.06 | | 4.73 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,895,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 185.18 | | | Ref: Technical Parameters |
| Diameter (In) | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 722,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 36,100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **1,521,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 119.68 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **5,953,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 65,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **130,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **20,088,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 119.68 | | 185.18 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 131.65 | | 203.70 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 79 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **17,712,000** | **$** | **97,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 185.18 | | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 119.68 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,953,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 131.65 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 180 | | 86 | |
| Passes | | 7 | | **15.20** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,288,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 124,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **248,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **26,796,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 119.68 | | 185.18 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 20,000 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 201 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 101 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 1.82 | | 243,612 | |
| **Construction Cost (CSOTF) $** | **16,742,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 119.68 | | 185.18 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 75 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **16,252,000** | **$** | **92,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 185.18 | | | Ref: CSO Statistics |
| Diameter (In) | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 365,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 18,250 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **891,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 119.68 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **5,953,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 119.68 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 171 | | 82 | |
| Passes | 7 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **2,182,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 53,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **106,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **42,456,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 119.68 | | 185.18 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,410 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 54 | | **OK** | Input by Engineer |
| Width (Ft) | | 27 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **21,303,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 131.65 | | 203.70 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 79 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **17,712,000** | **$** | **97,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 185.18 | | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 35,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,750 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **142,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 119.68 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,953,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 131.65 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 180 | | 86 | Input by Engineer |
| Passes | | 7 | | **15.20** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,288,000 | $ | 2,900,000 | |
| **Construction Cost (Disinfection)** | **$** | **5,188,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 77,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **154,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **50,787,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 408,745 | CF |
| | 3.06 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 185.18 | CFS |
| | 119.68 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 119.68 | | 185.18 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,953,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 119.68 | | 185.18 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 75 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **16,252,000** | **$** | **92,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 185.18 | | | Ref: CSO Statistics |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 37,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **148,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 119.68 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 171 | | 82 | |
| Passes | | 7 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,182,000 | $ | 2,694,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,876,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 35,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **27,629,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 321 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **48,150,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 139,828 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **280,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **48,469,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 2.96 | | 396,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 3.48 | | 466,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 217 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 145 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 3.53 | | 471,975 | **Sufficient Volume** |
| Tank Area (SF) | 31,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **3,080,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 91.62 | | 141.77 | = Peak Rate |
| Force Main Diameter (In) | 66 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **12,829,000** | **$** | **80,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 141.77 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 699,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,500 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **244,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 91.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **4,654,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 63,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **126,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **21,212,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 2.96 | | 396,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 3.48 | | 466,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 217 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 145 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 3.53 | | 471,975 | **Sufficient Volume** |
| Tank Area (SF) | 31,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **10,036,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 2.96 | | 4.58 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,878,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 141.77 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 699,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 34,950 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **1,483,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 91.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **4,654,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 63,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **126,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **18,397,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 91.62 | | 141.77 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 100.78 | | 155.94 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 69 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,947,000** | **$** | **83,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 141.77 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 91.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,654,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 100.78 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 157 | | 75 | |
| Passes | | 7 | | **15.10** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,986,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 95,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **190,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **21,319,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 91.62 | | 141.77 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 15,300 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 176 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 88 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 1.39 | | 185,856 | |
| **Construction Cost (CSOTF) $** | **16,550,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 91.62 | | 141.77 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 66 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **12,829,000** | **$** | **80,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 141.77 | | | Ref: CSO Statistics |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 279,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 13,950 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **722,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 91.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **4,654,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 91.62 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 150 | | 72 | |
| Passes | 7 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **1,878,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 42,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **84,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **36,996,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 91.62 | | 141.77 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,080 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 47 | | **OK** | Input by Engineer |
| Width (Ft) | | 24 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **16,333,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 100.78 | | 155.94 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 69 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,947,000** | **$** | **83,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 141.77 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 27,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **116,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 91.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,654,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 100.78 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 157 | | 75 | Input by Engineer |
| Passes | | 7 | | **15.10** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,986,000 | $ | 2,374,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,360,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 64,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **128,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **39,820,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 395,991 | CF |
| | 2.96 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 141.77 | CFS |
| | 91.62 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 91.62 | | 141.77 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,654,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 91.62 | | 141.77 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 66 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **12,829,000** | **$** | **80,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 141.77 | | | Ref: CSO Statistics |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **160,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 28,400 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,420 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **120,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 91.62 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 150 | | 72 | |
| Passes | | 7 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,878,000 | $ | 2,230,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,108,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 32,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **64,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **22,054,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 321 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **48,150,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 139,828 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **280,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **48,469,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 2.34 | | 313,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 2.75 | | 368,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 193 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 129 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 2.79 | | 373,455 | **Sufficient Volume** |
| Tank Area (SF) | 25,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,382,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 64.13 | | 99.24 | = Peak Rate |
| Force Main Diameter (In) | 55 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,476,000** | **$** | **66,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 99.24 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 552,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,760 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **203,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 64.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,382,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 54,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **108,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **15,781,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 2.34 | | 313,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 2.75 | | 368,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 193 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 129 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 2.79 | | 373,455 | **Sufficient Volume** |
| Tank Area (SF) | 25,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **8,121,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 2.34 | | 3.62 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 11 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,770,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 99.24 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 552,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 27,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **1,233,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 64.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,382,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 54,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **108,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **14,798,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 4 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 64.13 | 99.24 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 70.55 | 109.16 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 58 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,258,000** | **$ 69,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 99.24 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 64.13 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,382,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 70.55 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 132 | 63 | |
| Passes | | 5 | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,598,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 67,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **134,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 15,865,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 64.13 | | 99.24 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 10,700 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 147 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 74 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.98 | | 130,536 | |
| **Construction Cost (CSOTF) $** | **16,431,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 64.13 | | 99.24 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 55 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,476,000** | **$** | **66,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 99.24 | | | Ref: CSO Statistics |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 196,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 9,800 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **548,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 64.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,382,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 64.13 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 126 | | 60 | |
| Passes | 5 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **1,504,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 31,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **62,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **31,633,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 64.13 | | 99.24 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 760 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 40 | | **OK** | Input by Engineer |
| Width (Ft) | | 20 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **11,617,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 70.55 | | 109.16 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 58 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,258,000** | **$** | **69,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 99.24 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 19,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 950 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **88,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 64.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,382,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 70.55 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 132 | | 63 | Input by Engineer |
| Passes | | 5 | | **15.24** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,598,000 | $ | 1,681,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,279,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 52,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **104,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **28,961,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 312,872 | CF |
| | 2.34 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 99.24 | CFS |
| | 64.13 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | |
| 4 Overflows / Year | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 64.13 | | 99.24 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 3,382,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 64.13 | | 99.24 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 55 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 9,476,000** | **$** | **66,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 99.24 | | | Ref: CSO Statistics |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 19,800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 990 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 91,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 64.13 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 126 | | 60 | |
| Passes | 5 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ 1,504,000 | $ | 1,572,000 | |
| **Construction Cost (Disinfection)** | **$ 3,076,000** | | | |
| **6. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 29,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 58,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **16,313,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 321 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **48,150,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 139,828 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **280,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **48,469,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.82 | | 243,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 2.14 | | 286,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 170 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 114 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 2.17 | | 290,700 | **Sufficient Volume** |
| Tank Area (SF) | 19,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,809,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 42.11 | | 65.16 | = Peak Rate |
| Force Main Diameter (In) | 45 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **6,789,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 65.16 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 429,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,150 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **167,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 42.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,362,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 46,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **92,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **11,437,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.82 | | 243,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 2.14 | | 286,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 170 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 114 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 2.17 | | 290,700 | **Sufficient Volume** |
| Tank Area (SF) | 19,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **6,514,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.82 | | 2.81 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 9 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,676,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 65.16 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 429,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 21,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **1,012,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 42.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,362,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 46,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **92,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **11,839,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 42.11 | | 65.16 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 46.32 | | 71.67 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 47 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **7,303,000** | **$** | **56,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 65.16 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 42.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,362,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 46.32 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 107 | | 51 | |
| Passes | | 5 | | **15.23** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,221,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 44,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **88,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **11,454,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 42.11 | | 65.16 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 7,100 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 120 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 60 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.65 | | 86,400 | |
| **Construction Cost (CSOTF) $** | **16,381,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 42.11 | | 65.16 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 45 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **6,789,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 65.16 | | | Ref: CSO Statistics |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 130,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 6,500 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **397,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 42.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,362,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 42.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 102 | | 49 | |
| Passes | 3 | | **15.34** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **1,150,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 22,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **27,341,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | |
|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | |
| 6 Overflows / Year | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 42.11 | | 65.16 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 500 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 33 | | **OK** | Input by Engineer |
| Width (Ft) | 16 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | Input by Engineer |
| **Construction Cost (HREOP) $** | **7,948,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 46.32 | | 71.67 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | 47 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **7,303,000** | **$** | **56,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 65.16 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 13,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 650 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **65,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | 42.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,362,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Input by Engineer |
| Peak Flow (MGD) | 46.32 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 107 | | 51 | Input by Engineer |
| Passes | 5 | | **15.23** | Input by Engineer / 12' SWD Basis |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,221,000 | $ | 1,255,000 | |
| **Construction Cost (Disinfection) $** | **2,476,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 41,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **82,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **20,456,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 84 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 243,114 | CF |
| | 1.82 | MG |
| Total Volume | 6,875,782 | CF |
| | 51.43 | MG |
| Peak Rate | 65.16 | CFS |
| | 42.11 | MGD |

| Capital Costs - 039K001 / Sewershed CSO 039K001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 42.11 | | 65.16 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,362,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 42.11 | | 65.16 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 45 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,789,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 65.16 | | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 13,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 650 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 42.11 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 102 | | 49 | |
| Passes | | 3 | | **15.34** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,150,000 | $ | 1,029,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,179,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 27,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **11,667,000** | | | |

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| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 178.87 | $601,184 | 20 | 10.910 | $6,558,878 |
| | Tank O&M | No. Events / Yr | 84 | $71,160 | 50 | 14.484 | $1,030,647 |
| | | Const Cost ($) | $7,820,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 179 | $28,102 | 20 | 10.910 | $306,591 |
| | Odor Control O&M | Capacity (cfm) | 8,220 | $28,770 | 20 | 10.910 | $313,879 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $120,719 |
| | | | **Total Annual O&M** | **$730,000** | | **Total PW O&M** | **$8,331,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 6.97 | $68,746 | 20 | 10.910 | $750,011 |
| | Tank O&M | No. Events / Yr | 84 | $107,520 | 50 | 14.484 | $1,557,270 |
| | | Const Cost ($) | $22,364,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 179 | $28,102 | 20 | 10.910 | $306,591 |
| | Odor Control O&M | Capacity (cfm) | 82,150 | $287,525 | 20 | 10.910 | $3,136,880 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $41,620 |
| | | | **Total Annual O&M** | **$492,000** | | **Total PW O&M** | **$5,792,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 178.87 | $601,184 | 20 | 10.910 | $6,558,878 |
| | Sed. Basin O&M | Flow Rate (mgd) | 178.87 | $20,123 | 50 | 14.484 | $291,450 |
| | Screening O&M | Flow Rate (mgd) | 178.87 | $28,102 | 20 | 10.910 | $306,591 |
| | Disinfection O&M | Flow Rate (mgd) | 178.87 | $378,905 | 20 | 10.910 | $4,133,831 |
| | Odor Control O&M | Capacity (cfm) | 27,250.00 | $95,375 | 20 | 10.910 | $1,040,535 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $129,717 |
| | | | **Total Annual O&M** | **$1,124,000** | | **Total PW O&M** | **$12,461,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 196.76 | $640,710 | 20 | 10.910 | $6,990,110 |
| | HREP O&M | Flow Rate (mgd) | 178.87 | $491,952 | 20 | 10.910 | $5,367,166 |
| | Screening O&M | Flow Rate (mgd) | 178.87 | $28,102 | 20 | 10.910 | $306,591 |
| | Disinfection O&M | Flow Rate (mgd) | 196.76 | $401,557 | 20 | 10.910 | $4,380,959 |
| | Odor Control O&M | Capacity (cfm) | 2,600.00 | $9,100 | 20 | 10.910 | $99,280 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $223,823 |
| | | | **Total Annual O&M** | **$1,572,000** | | **Total PW O&M** | **$17,368,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 196.76 | $640,710 | 20 | 10.910 | $6,990,110 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 178.87 | $20,123 | 20 | 10.910 | $219,538 |
| | Screening O&M | Flow Rate (mgd) | 178.87 | $28,102 | 20 | 10.910 | $306,591 |
| | Disinfection O&M | Flow Rate (mgd) | 196.76 | $401,557 | 20 | 10.910 | $4,380,959 |
| | Odor Control O&M | Capacity (cfm) | 27,400.00 | $95,900 | 20 | 10.910 | $1,046,263 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $148,530 |
| | | | **Total Annual O&M** | **$1,187,000** | | **Total PW O&M** | **$13,092,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 178.87 | $601,184 | 20 | 10.910 | $6,558,878 |
| | Screening O&M | Flow Rate (mgd) | 178.87 | $28,102 | 20 | 10.910 | $306,591 |
| | Disinfection O&M | Flow Rate (mgd) | 178.87 | $378,905 | 20 | 10.910 | $4,133,831 |
| | Odor Control O&M | Capacity (cfm) | 2,770.00 | $9,695 | 20 | 10.910 | $105,772 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $126,951 |
| | | | **Total Annual O&M** | **$1,018,000** | | **Total PW O&M** | **$11,232,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 119.68 | $459,632 | 20 | 10.910 | $5,014,553 |
| | Tank O&M | No. Events / Yr | 84 | $59,580 | 50 | 14.484 | $862,927 |
| | | Const Cost ($) | $3,188,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 120 | $19,970 | 20 | 10.910 | $217,874 |
| | Odor Control O&M | Capacity (cfm) | 3,610 | $12,635 | 20 | 10.910 | $137,847 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $83,180 |
| | | | **Total Annual O&M** | **$552,000** | | **Total PW O&M** | **$6,316,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.06 | $39,660 | 20 | 10.910 | $432,689 |
| | Tank O&M | No. Events / Yr | 84 | $77,435 | 50 | 14.484 | $1,121,531 |
| | | Const Cost ($) | $10,330,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 120 | $19,970 | 20 | 10.910 | $217,874 |
| | Odor Control O&M | Capacity (cfm) | 36,100 | $126,350 | 20 | 10.910 | $1,378,471 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $28,061 |
| | | | **Total Annual O&M** | **$264,000** | | **Total PW O&M** | **$3,179,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 119.68 | $459,632 | 20 | 10.910 | $5,014,553 |
| | Sed. Basin O&M | Flow Rate (mgd) | 119.68 | $13,464 | 50 | 14.484 | $195,004 |
| | Screening O&M | Flow Rate (mgd) | 119.68 | $19,970 | 20 | 10.910 | $217,874 |
| | Disinfection O&M | Flow Rate (mgd) | 119.68 | $296,628 | 20 | 10.910 | $3,236,195 |
| | Odor Control O&M | Capacity (cfm) | 18,250.00 | $63,875 | 20 | 10.910 | $696,872 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $90,859 |
| | | | **Total Annual O&M** | **$854,000** | | **Total PW O&M** | **$9,451,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 131.65 | $489,851 | 20 | 10.910 | $5,344,249 |
| | HREP O&M | Flow Rate (mgd) | 119.68 | $388,407 | 20 | 10.910 | $4,237,496 |
| | Screening O&M | Flow Rate (mgd) | 119.68 | $19,970 | 20 | 10.910 | $217,874 |
| | Disinfection O&M | Flow Rate (mgd) | 131.65 | $314,361 | 20 | 10.910 | $3,429,661 |
| | Odor Control O&M | Capacity (cfm) | 1,750.00 | $6,125 | 20 | 10.910 | $66,823 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $153,011 |
| | | | **Total Annual O&M** | **$1,219,000** | | **Total PW O&M** | **$13,449,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 131.65 | $489,851 | 20 | 10.910 | $5,344,249 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 119.68 | $13,464 | 20 | 10.910 | $146,889 |
| | Screening O&M | Flow Rate (mgd) | 119.68 | $19,970 | 20 | 10.910 | $217,874 |
| | Disinfection O&M | Flow Rate (mgd) | 131.65 | $314,361 | 20 | 10.910 | $3,429,661 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $94,680 |
| | | | **Total Annual O&M** | **$838,000** | | **Total PW O&M** | **$9,233,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 119.68 | $459,632 | 20 | 10.910 | $5,014,553 |
| | Screening O&M | Flow Rate (mgd) | 119.68 | $19,970 | 20 | 10.910 | $217,874 |
| | Disinfection O&M | Flow Rate (mgd) | 119.68 | $296,628 | 20 | 10.910 | $3,236,195 |
| | Odor Control O&M | Capacity (cfm) | 1,850.00 | $6,475 | 20 | 10.910 | $70,642 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $88,838 |
| | | | **Total Annual O&M** | **$783,000** | | **Total PW O&M** | **$8,628,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 91.62 | $384,498 | 20 | 10.910 | $4,194,850 |
| | Tank O&M | No. Events / Yr | 84 | $59,310 | 50 | 14.484 | $859,016 |
| | | Const Cost ($) | $3,080,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 92 | $16,562 | 20 | 10.910 | $180,694 |
| | Odor Control O&M | Capacity (cfm) | 3,500 | $12,250 | 20 | 10.910 | $133,647 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $65,665 |
| | | | **Total Annual O&M** | **$473,000** | | **Total PW O&M** | **$5,434,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.96 | $38,829 | 20 | 10.910 | $423,622 |
| | Tank O&M | No. Events / Yr | 84 | $76,700 | 50 | 14.484 | $1,110,886 |
| | | Const Cost ($) | $10,036,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 92 | $16,562 | 20 | 10.910 | $180,694 |
| | Odor Control O&M | Capacity (cfm) | 34,950 | $122,325 | 20 | 10.910 | $1,334,558 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,355 |
| | | | **Total Annual O&M** | **$255,000** | | **Total PW O&M** | **$3,074,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 91.62 | $384,498 | 20 | 10.910 | $4,194,850 |
| | Sed. Basin O&M | Flow Rate (mgd) | 91.62 | $10,307 | 50 | 14.484 | $149,286 |
| | Screening O&M | Flow Rate (mgd) | 91.62 | $16,562 | 20 | 10.910 | $180,694 |
| | Disinfection O&M | Flow Rate (mgd) | 91.62 | $252,075 | 20 | 10.910 | $2,750,127 |
| | Odor Control O&M | Capacity (cfm) | 13,950.00 | $48,825 | 20 | 10.910 | $532,678 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $72,073 |
| | | | **Total Annual O&M** | **$713,000** | | **Total PW O&M** | **$7,880,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 100.78 | $409,778 | 20 | 10.910 | $4,470,652 |
| | HREP O&M | Flow Rate (mgd) | 91.62 | $331,935 | 20 | 10.910 | $3,621,391 |
| | Screening O&M | Flow Rate (mgd) | 91.62 | $16,562 | 20 | 10.910 | $180,694 |
| | Disinfection O&M | Flow Rate (mgd) | 100.78 | $267,145 | 20 | 10.910 | $2,914,534 |
| | Odor Control O&M | Capacity (cfm) | 1,350.00 | $4,725 | 20 | 10.910 | $51,549 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $119,706 |
| | | | **Total Annual O&M** | **$1,031,000** | | **Total PW O&M** | **$11,359,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 100.78 | $409,778 | 20 | 10.910 | $4,470,652 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 91.62 | $10,307 | 20 | 10.910 | $112,451 |
| | Screening O&M | Flow Rate (mgd) | 91.62 | $16,562 | 20 | 10.910 | $180,694 |
| | Disinfection O&M | Flow Rate (mgd) | 100.78 | $267,145 | 20 | 10.910 | $2,914,534 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $74,965 |
| | | | **Total Annual O&M** | **$704,000** | | **Total PW O&M** | **$7,753,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 91.62 | $384,498 | 20 | 10.910 | $4,194,850 |
| | Screening O&M | Flow Rate (mgd) | 91.62 | $16,562 | 20 | 10.910 | $180,694 |
| | Disinfection O&M | Flow Rate (mgd) | 91.62 | $252,075 | 20 | 10.910 | $2,750,127 |
| | Odor Control O&M | Capacity (cfm) | 1,420.00 | $4,970 | 20 | 10.910 | $54,222 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $70,436 |
| | | | **Total Annual O&M** | **$659,000** | | **Total PW O&M** | **$7,250,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 64.13 | $302,970 | 20 | 10.910 | $3,305,388 |
| | Tank O&M | No. Events / Yr | 84 | $57,565 | 50 | 14.484 | $833,742 |
| | | Const Cost ($) | $2,382,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 64 | $13,503 | 20 | 10.910 | $147,312 |
| | Odor Control O&M | Capacity (cfm) | 2,760 | $9,660 | 20 | 10.910 | $105,390 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $48,413 |
| | | | **Total Annual O&M** | **$384,000** | | **Total PW O&M** | **$4,440,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.34 | $33,174 | 20 | 10.910 | $361,925 |
| | Tank O&M | No. Events / Yr | 84 | $71,912 | 50 | 14.484 | $1,041,546 |
| | | Const Cost ($) | $8,121,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 64 | $13,503 | 20 | 10.910 | $147,312 |
| | Odor Control O&M | Capacity (cfm) | 27,600 | $96,600 | 20 | 10.910 | $1,053,900 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,774 |
| | | | **Total Annual O&M** | **$216,000** | | **Total PW O&M** | **$2,624,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 64.13 | $302,970 | 20 | 10.910 | $3,305,388 |
| | Sed. Basin O&M | Flow Rate (mgd) | 64.13 | $7,215 | 50 | 14.484 | $104,499 |
| | Screening O&M | Flow Rate (mgd) | 64.13 | $13,503 | 20 | 10.910 | $147,312 |
| | Disinfection O&M | Flow Rate (mgd) | 64.13 | $202,843 | 20 | 10.910 | $2,213,007 |
| | Odor Control O&M | Capacity (cfm) | 9,800.00 | $34,300 | 20 | 10.910 | $374,211 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $53,443 |
| | | | **Total Annual O&M** | **$561,000** | | **Total PW O&M** | **$6,198,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 70.55 | $322,890 | 20 | 10.910 | $3,522,710 |
| | HREP O&M | Flow Rate (mgd) | 64.13 | $269,124 | 20 | 10.910 | $2,936,122 |
| | Screening O&M | Flow Rate (mgd) | 64.13 | $13,503 | 20 | 10.910 | $147,312 |
| | Disinfection O&M | Flow Rate (mgd) | 70.55 | $214,970 | 20 | 10.910 | $2,345,304 |
| | Odor Control O&M | Capacity (cfm) | 950.00 | $3,325 | 20 | 10.910 | $36,276 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $87,236 |
| | | | **Total Annual O&M** | **$824,000** | | **Total PW O&M** | **$9,075,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 70.55 | $322,890 | 20 | 10.910 | $3,522,710 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 64.13 | $7,215 | 20 | 10.910 | $78,715 |
| | Screening O&M | Flow Rate (mgd) | 64.13 | $13,503 | 20 | 10.910 | $147,312 |
| | Disinfection O&M | Flow Rate (mgd) | 70.55 | $214,970 | 20 | 10.910 | $2,345,304 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $55,398 |
| | | | **Total Annual O&M** | **$559,000** | | **Total PW O&M** | **$6,149,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 64.13 | $302,970 | 20 | 10.910 | $3,305,388 |
| | Screening O&M | Flow Rate (mgd) | 64.13 | $13,503 | 20 | 10.910 | $147,312 |
| | Disinfection O&M | Flow Rate (mgd) | 64.13 | $202,843 | 20 | 10.910 | $2,213,007 |
| | Odor Control O&M | Capacity (cfm) | 990.00 | $3,465 | 20 | 10.910 | $37,803 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $52,200 |
| | | | **Total Annual O&M** | **$523,000** | | **Total PW O&M** | **$5,756,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 42.11 | $228,739 | 20 | 10.910 | $2,495,529 |
| | Tank O&M | No. Events / Yr | 84 | $56,132 | 50 | 14.484 | $812,994 |
| | | Const Cost ($) | $1,809,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 42 | $11,250 | 20 | 10.910 | $122,735 |
| | Odor Control O&M | Capacity (cfm) | 2,150 | $7,525 | 20 | 10.910 | $82,097 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $34,578 |
| | | | **Total Annual O&M** | **$304,000** | | **Total PW O&M** | **$3,548,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.82 | $28,029 | 20 | 10.910 | $305,790 |
| | Tank O&M | No. Events / Yr | 84 | $67,895 | 50 | 14.484 | $983,358 |
| | | Const Cost ($) | $6,514,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 42 | $11,250 | 20 | 10.910 | $122,735 |
| | Odor Control O&M | Capacity (cfm) | 21,450 | $75,075 | 20 | 10.910 | $819,064 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,015 |
| | | | **Total Annual O&M** | **$183,000** | | **Total PW O&M** | **$2,247,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 42.11 | $228,739 | 20 | 10.910 | $2,495,529 |
| | Sed. Basin O&M | Flow Rate (mgd) | 42.11 | $4,737 | 50 | 14.484 | $68,614 |
| | Screening O&M | Flow Rate (mgd) | 42.11 | $11,250 | 20 | 10.910 | $122,735 |
| | Disinfection O&M | Flow Rate (mgd) | 42.11 | $156,986 | 20 | 10.910 | $1,712,710 |
| | Odor Control O&M | Capacity (cfm) | 6,500.00 | $22,750 | 20 | 10.910 | $248,201 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $38,332 |
| | | | **Total Annual O&M** | **$425,000** | | **Total PW O&M** | **$4,686,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 46.32 | $243,778 | 20 | 10.910 | $2,659,605 |
| | HREP O&M | Flow Rate (mgd) | 42.11 | $210,140 | 20 | 10.910 | $2,292,610 |
| | Screening O&M | Flow Rate (mgd) | 42.11 | $11,250 | 20 | 10.910 | $122,735 |
| | Disinfection O&M | Flow Rate (mgd) | 46.32 | $166,371 | 20 | 10.910 | $1,815,099 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $61,337 |
| | | | **Total Annual O&M** | **$634,000** | | **Total PW O&M** | **$6,976,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 46.32 | $243,778 | 20 | 10.910 | $2,659,605 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 42.11 | $4,737 | 20 | 10.910 | $51,684 |
| | Screening O&M | Flow Rate (mgd) | 42.11 | $11,250 | 20 | 10.910 | $122,735 |
| | Disinfection O&M | Flow Rate (mgd) | 46.32 | $166,371 | 20 | 10.910 | $1,815,099 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $39,542 |
| | | | **Total Annual O&M** | **$427,000** | | **Total PW O&M** | **$4,689,000** |

| CSO 039K001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 42.11 | $228,739 | 20 | 10.910 | $2,495,529 |
| | Screening O&M | Flow Rate (mgd) | 42.11 | $11,250 | 20 | 10.910 | $122,735 |
| | Disinfection O&M | Flow Rate (mgd) | 42.11 | $156,986 | 20 | 10.910 | $1,712,710 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $37,429 |
| | | | **Total Annual O&M** | **$400,000** | | **Total PW O&M** | **$4,393,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $48.5 | $48,469,000 | $0 |
| 1 | $48.5 | $48,469,000 | $0 |
| 2 | $48.5 | $48,469,000 | $0 |
| 4 | $48.5 | $48,469,000 | $0 |
| 6 | $48.5 | $48,469,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $42.8 | $37,008,000 | $5,792,000 |
| 1 | $23.3 | $20,088,000 | $3,179,000 |
| 2 | $21.5 | $18,397,000 | $3,074,000 |
| 4 | $17.4 | $14,798,000 | $2,624,000 |
| 6 | $14.1 | $11,839,000 | $2,247,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $49.5 | $41,134,000 | $8,331,000 |
| 1 | $32.4 | $26,103,000 | $6,316,000 |
| 2 | $26.6 | $21,212,000 | $5,434,000 |
| 4 | $20.2 | $15,781,000 | $4,440,000 |
| 6 | $15.0 | $11,437,000 | $3,548,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $59.5 | $46,431,000 | $13,092,000 |
| 1 | $36.0 | $26,796,000 | $9,233,000 |
| 2 | $29.1 | $21,319,000 | $7,753,000 |
| 4 | $22.0 | $15,865,000 | $6,149,000 |
| 6 | $16.1 | $11,454,000 | $4,689,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $91.4 | $74,022,000 | $17,368,000 |
| 1 | $64.2 | $50,787,000 | $13,449,000 |
| 2 | $51.2 | $39,820,000 | $11,359,000 |
| 4 | $38.0 | $28,961,000 | $9,075,000 |
| 6 | $27.4 | $20,456,000 | $6,976,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $66.4 | $53,889,000 | $12,461,000 |
| 1 | $51.9 | $42,456,000 | $9,451,000 |
| 2 | $44.9 | $36,996,000 | $7,880,000 |
| 4 | $37.8 | $31,633,000 | $6,198,000 |
| 6 | $32.0 | $27,341,000 | $4,686,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $50.3 | $39,085,000 | $11,232,000 |
| 1 | $36.3 | $27,629,000 | $8,628,000 |
| 2 | $29.3 | $22,054,000 | $7,250,000 |
| 4 | $22.1 | $16,313,000 | $5,756,000 |
| 6 | $16.1 | $11,667,000 | $4,393,000 |

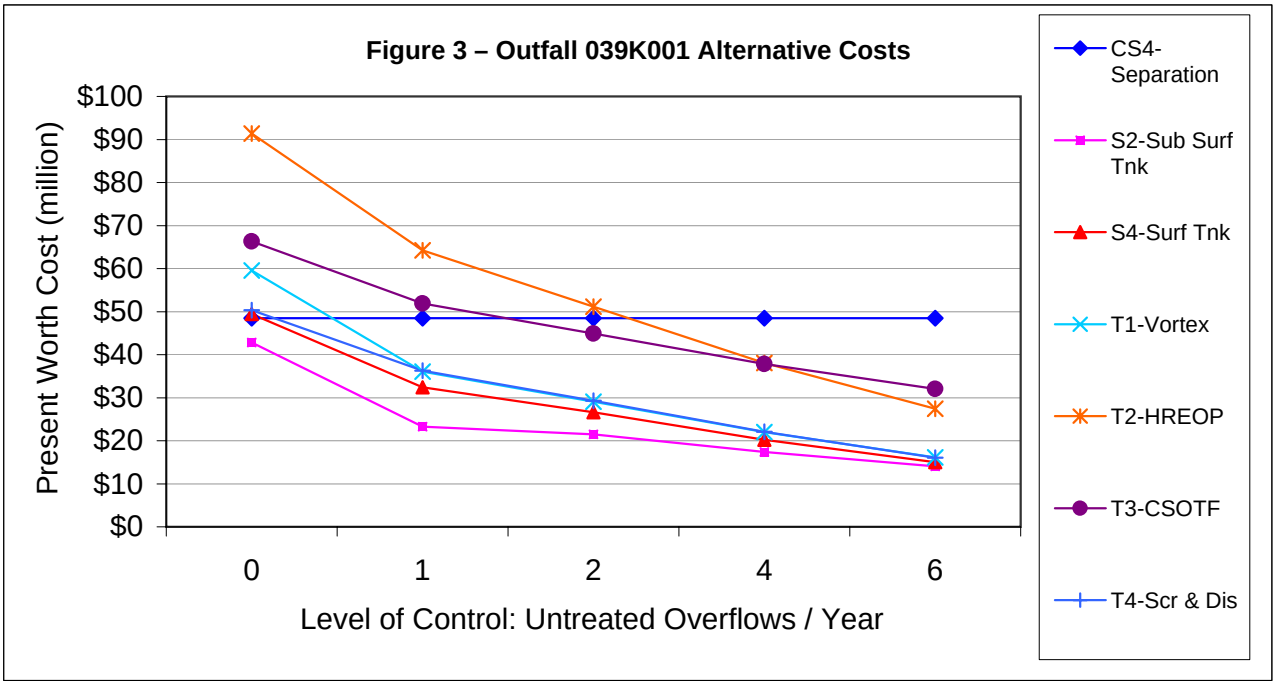


Figure 3 – Outfall 039K001 Alternative Costs
Present Worth Cost (million)
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 039K001 |
| **Location Name** | Keever Avenue and Brett Street |
| **Model ID** | JCT 039K003.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Chartiers Creek and Bells Run |
| **Stream of Discharge** | Chartiers Creek |
| **NPDES Permit Number** | 039K001 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 84 |
| Peak Volume: | 931,153 $ft^3$ |
| | 6.97 MG |
| Total Volume: | 6,875,782 $ft^3$ |
| | 51.43 MG |
| Peak Rate: | 276.77 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 0:24 | 2658 | 1/5/2005 14:45 | 931153.33 | 6965.492 | 0 | 28.53 | 15 |
| 6/11/2005 17:25 | 169 | 6/11/2005 17:45 | 408744.70 | 3057.615 | 1 | 276.77 | 0 |
| 5/13/2005 22:30 | 1660 | 5/14/2005 16:15 | 395990.95 | 2962.210 | 2 | 141.77 | 2 |
| 10/24/2005 11:27 | 2086 | 10/25/2005 2:20 | 324180.15 | 2425.030 | 3 | 12.66 | 39 |
| 1/11/2005 7:55 | 1797 | 1/12/2005 1:30 | 312871.82 | 2340.438 | 4 | 19.74 | 26 |
| 11/29/2005 1:45 | 796 | 11/29/2005 7:00 | 247017.09 | 1847.811 | 5 | 23.53 | 21 |
| 7/26/2005 19:35 | 85 | 7/26/2005 20:00 | 243113.84 | 1818.613 | 6 | 185.18 | 1 |
| 2/14/2005 5:11 | 1397 | 2/14/2005 19:45 | 239625.47 | 1792.518 | 7 | 14.67 | 34 |
| 11/14/2005 21:48 | 749 | 11/15/2005 3:45 | 227006.72 | 1698.124 | 8 | 27.53 | 16 |
| 1/3/2005 4:31 | 1368 | 1/3/2005 13:45 | 216048.50 | 1616.151 | 9 | 11.31 | 42 |
| 3/28/2005 8:06 | 1179 | 3/28/2005 19:00 | 191651.58 | 1433.650 | 10 | 14.14 | 35 |
| 4/1/2005 19:20 | 1410 | 4/2/2005 6:30 | 186514.50 | 1395.222 | 11 | 20.35 | 24 |
| 8/20/2005 18:15 | 143 | 8/20/2005 18:30 | 184667.00 | 1381.402 | 12 | 104.48 | 3 |
| 4/22/2005 15:55 | 1219 | 4/23/2005 4:00 | 156937.57 | 1173.971 | 13 | 29.99 | 14 |
| 7/5/2005 16:20 | 142 | 7/5/2005 16:45 | 142679.77 | 1067.316 | 14 | 65.16 | 6 |
| 7/15/2005 17:35 | 94 | 7/15/2005 17:45 | 128007.77 | 957.562 | 15 | 56.71 | 9 |
| 9/29/2005 5:15 | 137 | 9/29/2005 5:45 | 118647.91 | 887.546 | 16 | 99.24 | 4 |
| 1/13/2005 22:40 | 509 | 1/14/2005 2:15 | 118071.33 | 883.233 | 17 | 19.96 | 25 |
| 12/15/2005 9:45 | 885 | 12/15/2005 14:00 | 109609.62 | 819.935 | 18 | 26.61 | 18 |
| 8/29/2005 9:05 | 439 | 8/29/2005 13:00 | 109493.68 | 819.067 | 19 | 26.64 | 17 |
| 1/8/2005 0:55 | 575 | 1/8/2005 5:15 | 107506.47 | 804.202 | 20 | 20.78 | 23 |
| 3/23/2005 2:31 | 786 | 3/23/2005 12:30 | 103359.98 | 773.184 | 21 | 10.24 | 43 |
| 7/21/2005 14:22 | 83 | 7/21/2005 14:45 | 97278.67 | 727.693 | 22 | 81.43 | 5 |
| 10/22/2005 6:25 | 1072 | 10/22/2005 7:00 | 87474.30 | 654.352 | 23 | 15.48 | 30 |
| 2/20/2005 15:34 | 738 | 2/20/2005 20:30 | 86932.13 | 650.296 | 24 | 18.36 | 28 |
| 5/11/2005 22:35 | 132 | 5/11/2005 22:45 | 79236.37 | 592.728 | 25 | 38.15 | 11 |
| 10/7/2005 7:15 | 628 | 10/7/2005 10:45 | 72428.08 | 541.798 | 26 | 13.45 | 38 |
| 11/9/2005 19:20 | 70 | 11/9/2005 19:45 | 64446.41 | 482.091 | 27 | 59.99 | 7 |
| 5/23/2005 16:20 | 95 | 5/23/2005 16:30 | 59128.24 | 442.309 | 28 | 58.32 | 8 |
| 5/28/2005 8:25 | 123 | 5/28/2005 9:00 | 57207.52 | 427.941 | 29 | 14.98 | 32 |
| 10/21/2005 18:47 | 224 | 10/21/2005 19:15 | 52615.69 | 393.592 | 30 | 12.08 | 40 |
| 2/9/2005 15:03 | 171 | 2/9/2005 16:45 | 47282.50 | 353.697 | 31 | 18.75 | 27 |
| 9/26/2005 6:12 | 295 | 9/26/2005 9:35 | 46727.22 | 349.543 | 32 | 13.66 | 37 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 5/20/2005 6:35 | 348 | 5/20/2005 7:45 | 45718.55 | 341.998 | 33 | 7.08 | 49 |
| 11/16/2005 4:05 | 453 | 11/16/2005 4:15 | 40858.09 | 305.639 | 34 | 24.90 | 19 |
| 4/30/2005 4:30 | 180 | 4/30/2005 5:45 | 40711.82 | 304.545 | 35 | 7.89 | 47 |
| 7/17/2005 16:10 | 92 | 7/17/2005 16:30 | 40213.17 | 300.815 | 36 | 34.44 | 13 |
| 11/23/2005 19:25 | 1026 | 11/23/2005 20:15 | 40096.25 | 299.940 | 37 | 2.72 | 61 |
| 11/1/2005 14:53 | 225 | 11/1/2005 16:30 | 39458.20 | 295.167 | 38 | 6.81 | 50 |
| 7/25/2005 13:20 | 65 | 7/25/2005 13:30 | 37562.02 | 280.983 | 39 | 52.33 | 10 |
| 4/20/2005 19:40 | 290 | 4/20/2005 23:25 | 34416.10 | 257.450 | 40 | 10.10 | 44 |
| 4/24/2005 14:44 | 955 | 4/24/2005 15:30 | 31792.81 | 237.826 | 41 | 1.97 | 68 |
| 3/7/2005 22:15 | 406 | 3/8/2005 0:30 | 31036.09 | 232.165 | 42 | 2.24 | 64 |
| 6/28/2005 18:07 | 83 | 6/28/2005 18:15 | 28153.36 | 210.601 | 43 | 36.28 | 12 |
| 12/25/2005 10:50 | 199 | 12/25/2005 12:50 | 27242.62 | 203.788 | 44 | 7.20 | 48 |
| 5/28/2005 17:18 | 115 | 5/28/2005 17:30 | 27227.08 | 203.672 | 45 | 14.01 | 36 |
| 5/7/2005 12:10 | 120 | 5/7/2005 13:30 | 25478.65 | 190.593 | 46 | 15.17 | 31 |
| 4/3/2005 1:02 | 444 | 4/3/2005 2:05 | 25455.56 | 190.420 | 47 | 2.70 | 62 |
| 1/30/2005 1:30 | 704 | 1/30/2005 11:20 | 25322.03 | 189.421 | 48 | 3.46 | 58 |
| 8/26/2005 20:50 | 68 | 8/26/2005 21:00 | 24953.45 | 186.664 | 49 | 23.03 | 22 |
| 8/27/2005 15:11 | 91 | 8/27/2005 15:30 | 24457.99 | 182.958 | 50 | 23.95 | 20 |
| 2/16/2005 7:07 | 256 | 2/16/2005 8:15 | 24095.14 | 180.244 | 51 | 8.14 | 46 |
| 4/26/2005 22:01 | 265 | 4/27/2005 0:30 | 22702.40 | 169.825 | 52 | 4.97 | 53 |
| 12/26/2005 4:42 | 455 | 12/26/2005 6:30 | 22599.16 | 169.053 | 53 | 2.08 | 67 |
| 10/21/2005 7:19 | 114 | 10/21/2005 7:30 | 21613.51 | 161.680 | 54 | 14.94 | 33 |
| 3/27/2005 16:55 | 111 | 3/27/2005 17:05 | 21383.79 | 159.961 | 55 | 8.63 | 45 |
| 12/4/2005 3:21 | 715 | 12/4/2005 6:50 | 21147.54 | 158.194 | 56 | 3.23 | 60 |
| 3/20/2005 3:46 | 321 | 3/20/2005 7:20 | 19866.91 | 148.614 | 57 | 5.13 | 52 |
| 8/8/2005 8:44 | 62 | 8/8/2005 8:50 | 16724.56 | 125.108 | 58 | 11.40 | 41 |
| 11/9/2005 4:20 | 85 | 11/9/2005 4:30 | 16629.30 | 124.395 | 59 | 15.74 | 29 |
| 1/22/2005 9:53 | 150 | 1/22/2005 11:20 | 14237.14 | 106.501 | 60 | 3.51 | 57 |
| 11/8/2005 11:14 | 275 | 11/8/2005 15:00 | 14216.91 | 106.350 | 61 | 4.24 | 54 |
| 10/24/2005 1:45 | 140 | 10/24/2005 3:05 | 14173.04 | 106.021 | 62 | 2.70 | 63 |
| 6/3/2005 8:45 | 83 | 6/3/2005 9:15 | 12613.15 | 94.353 | 63 | 5.73 | 51 |
| 8/5/2005 11:00 | 126 | 8/5/2005 11:30 | 12553.01 | 93.903 | 64 | 4.20 | 55 |
| 2/8/2005 5:50 | 426 | 2/8/2005 6:05 | 12497.53 | 93.488 | 65 | 1.80 | 70 |
| 2/26/2005 12:00 | 166 | 2/26/2005 13:15 | 12267.71 | 91.769 | 66 | 2.20 | 65 |
| 4/24/2005 1:46 | 373 | 4/24/2005 2:55 | 10773.85 | 80.594 | 67 | 1.08 | 74 |
| 6/14/2005 19:02 | 70 | 6/14/2005 19:35 | 7479.90 | 55.953 | 68 | 3.83 | 56 |
| 6/17/2005 1:30 | 86 | 6/17/2005 2:30 | 6984.85 | 52.250 | 69 | 1.90 | 69 |
| 9/16/2005 21:35 | 206 | 9/16/2005 21:45 | 5820.01 | 43.537 | 70 | 2.12 | 66 |
| 5/30/2005 19:35 | 58 | 5/30/2005 20:05 | 5194.95 | 38.861 | 71 | 3.26 | 59 |
| 12/11/2005 19:12 | 66 | 12/11/2005 19:50 | 3632.44 | 27.172 | 72 | 1.57 | 72 |
| 5/19/2005 21:12 | 65 | 5/19/2005 21:35 | 2118.29 | 15.846 | 73 | 0.67 | 79 |
| 7/12/2005 19:56 | 34 | 7/12/2005 20:05 | 1976.63 | 14.786 | 74 | 1.39 | 73 |
| 6/22/2005 5:22 | 72 | 6/22/2005 6:25 | 1806.84 | 13.516 | 75 | 0.77 | 77 |
| 11/6/2005 14:00 | 32 | 11/6/2005 14:10 | 1770.69 | 13.246 | 76 | 1.71 | 71 |
| 2/24/2005 21:31 | 32 | 2/24/2005 21:40 | 1191.48 | 8.913 | 77 | 0.85 | 76 |
| 6/16/2005 12:47 | 26 | 6/16/2005 12:55 | 1119.40 | 8.374 | 78 | 0.96 | 75 |
| 3/20/2005 15:48 | 26 | 3/20/2005 15:55 | 887.54 | 6.639 | 79 | 0.70 | 78 |
| 3/11/2005 14:19 | 21 | 3/11/2005 14:25 | 634.62 | 4.747 | 80 | 0.54 | 81 |
| 2/21/2005 11:25 | 20 | 2/21/2005 11:35 | 565.28 | 4.229 | 81 | 0.48 | 83 |
| 9/23/2005 3:02 | 14 | 9/23/2005 3:05 | 467.58 | 3.498 | 82 | 0.66 | 80 |
| 1/1/2005 0:00 | 8 | 1/1/2005 0:00 | 225.78 | 1.689 | 83 | 0.51 | 82 |

# Region 1

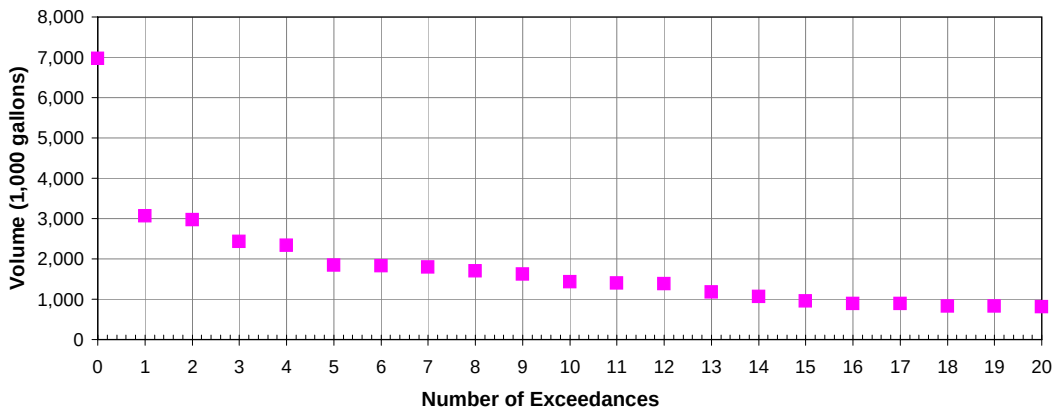
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 039K001 |
| **Location Name** | Keever Avenue and Brett Street |
| **Model ID** | JCT 039K003.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Chartiers Creek and Bells Run |
| **Stream of Discharge** | Chartiers Creek |
| **NPDES Permit Number** | 039K001 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

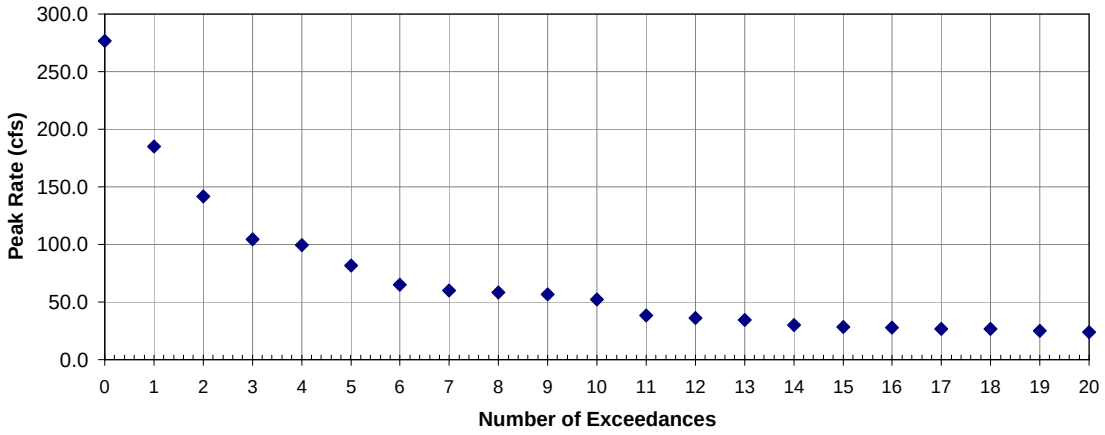
**Results Summary**

| | |
|---|---|
| Number of Events: | 84 |
| Peak Volume: | 931,153 $ft^3$ |
| | 6.97 MG |
| Total Volume: | 6,875,782 $ft^3$ |
| | 51.43 MG |
| Peak Rate: | 276.77 cfs |

### Figure 1 - Outfall CSO039K001 CSO Volume




### Figure 2 - Outfall CSO039K001 CSO Peak Flow Rate



## D.24.5 BELLS RUN SEWERSHED – BALDWICK ROAD - NPDES #039K001

### Description of Outfall

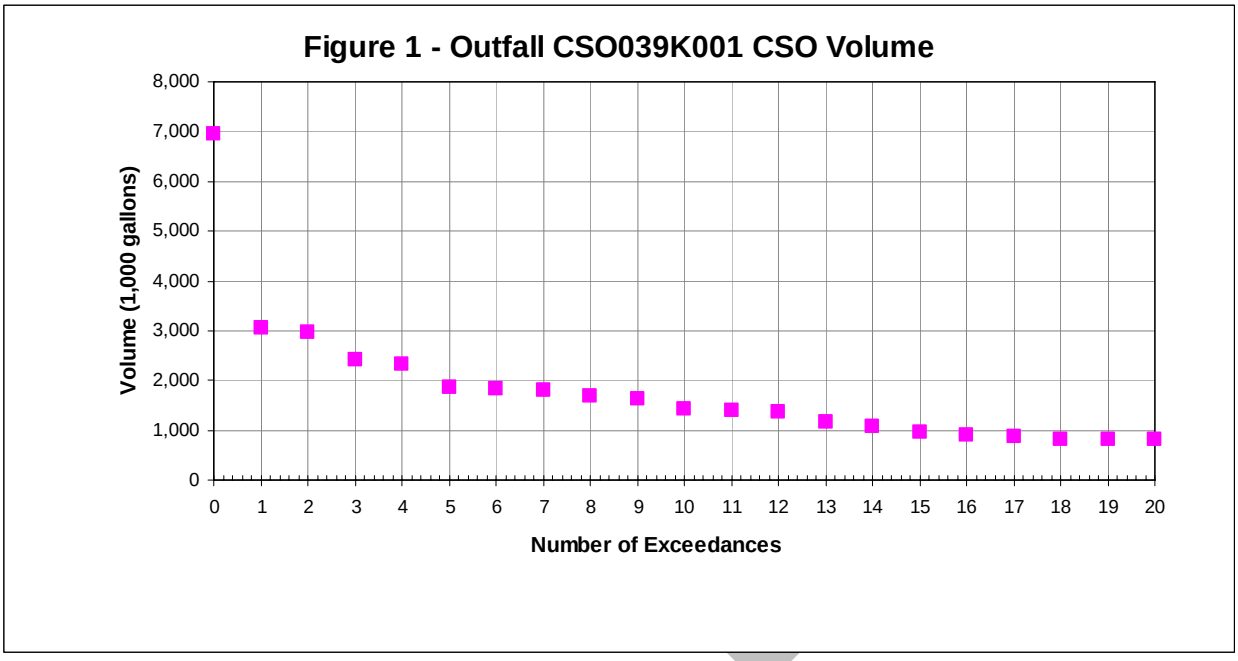
Outfall 039K001 conveys overflows from the PWSA diversion chamber 039K001 to Bells Run, Chartiers Creek, and ultimately into the Ohio River. The outfall is located along Bells Run, near Keever Avenue and Brett Street. The Bells Run Sewershed consists of 726 acres of residential, business and commercial users. The 039K001 Sewershed (Baldwick Road) consists of 321 acres, or approximately 44% of the total service area. The Bells Run Sewershed is comprised of approximately 301 manholes and 66,326 linear feet (12.6 miles) of sewer up to 66 inches in diameter.

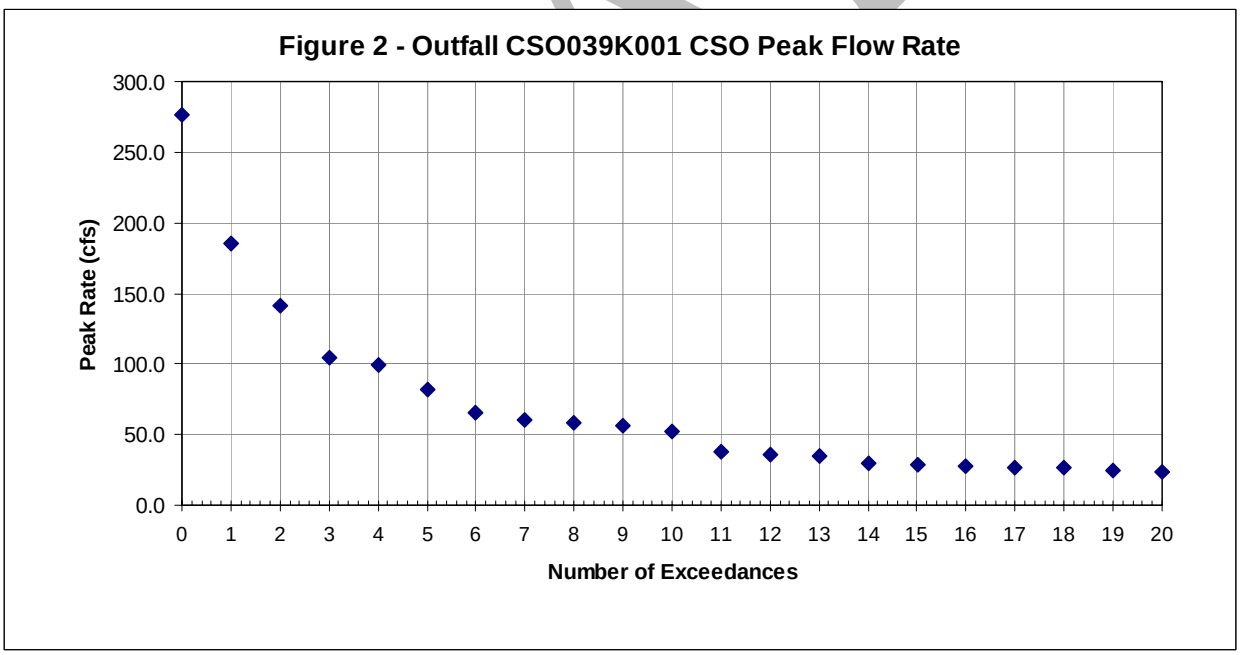
*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 039K001 typically experiences 84 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 039K001 is approximately 6.97 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 039K001 is approximately 276.77 CFS. *Figure 1 – Outfall 039K001 CSO Volume* and *Figure 2 – Outfall 039K001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

DRAFT


SW-D-0196.pdf




There appears to be available space for potential storage or treatment facilities adjacent to the outfall to the north of Baldwick Road. The site is generally bounded by Baldwick Road to the north and private development and steep slopes to the south, west and east. A significant storage and treatment facility footprint is required for the 0 control level.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 039K001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-039K001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-039K001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-039K001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-039K001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-039K001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-039K001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-039K001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

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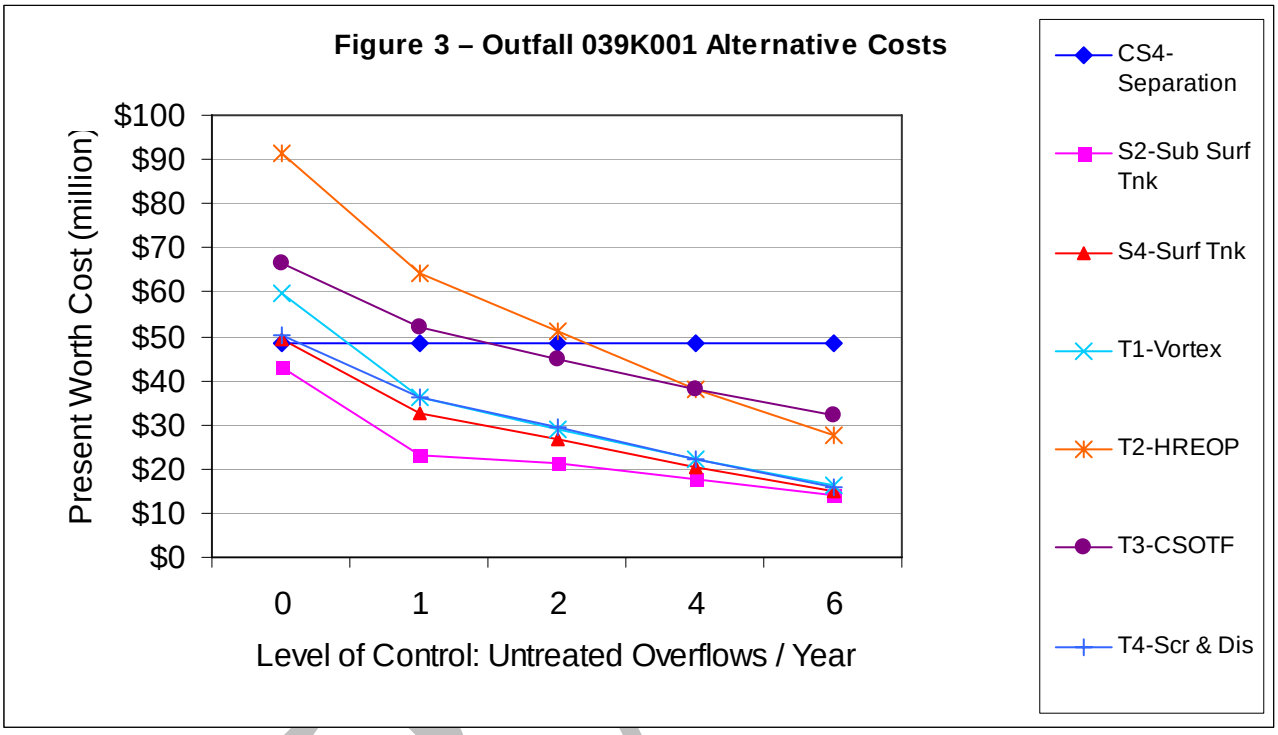
*Figure 3 – Outfall 039K001 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-039K001: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

A significant footprint will be required for control levels 0 through 2. Stream by-pass will be required during construction. An alternate site may exist on the south side of Noblestown Road, approximately 200 feet from the outfall. CSOs will need to be piped to this location and a significant roadway bore will be required.

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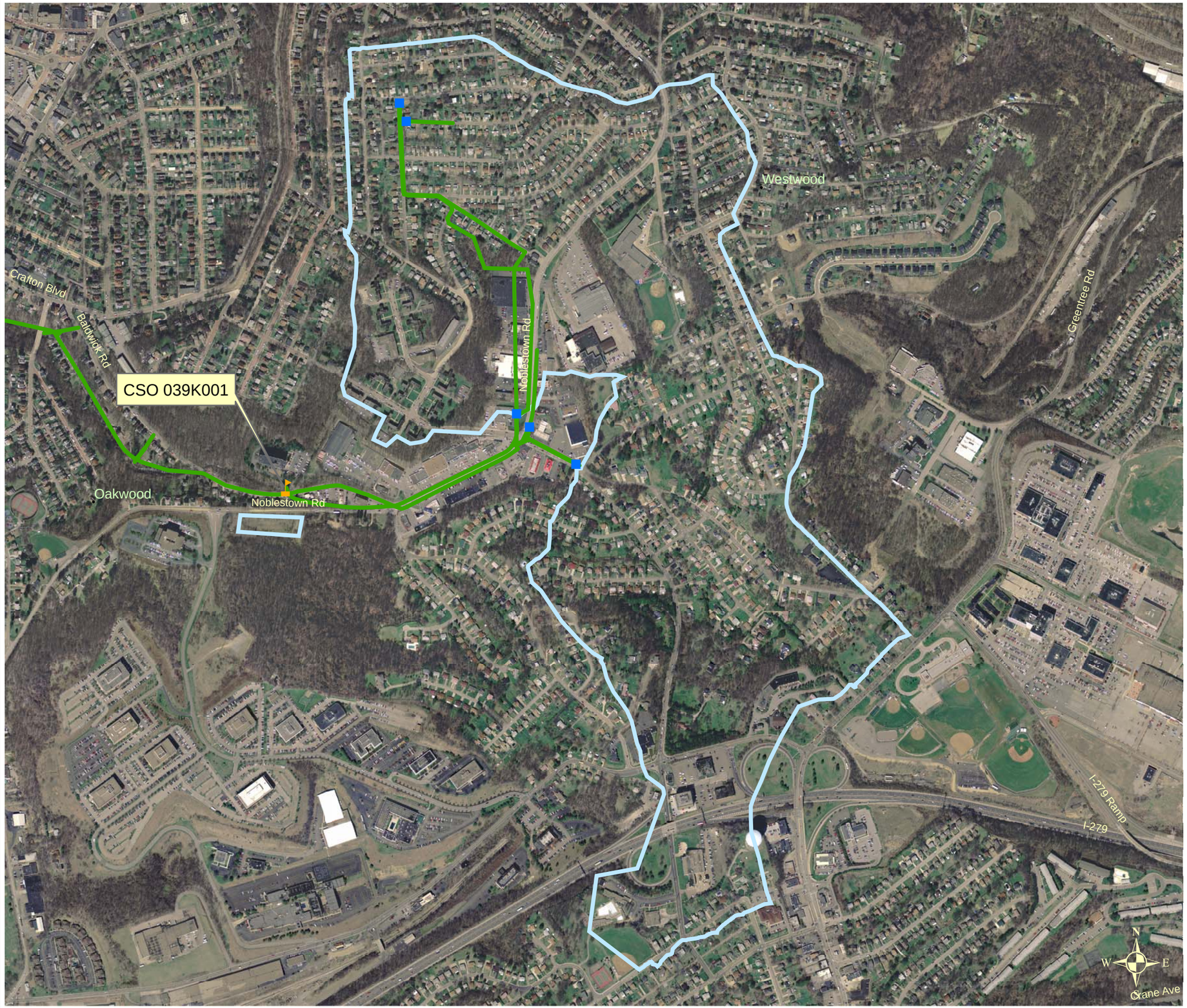


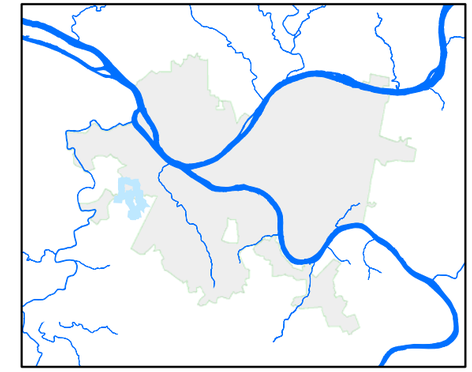

Area Overview

## Legend

- Sewershed Boundary
- Trunk Sewer
- PWSA Diversion Structure
- Combined Sewer Outfall

750 0 750 Feet

# Attachment 1
# CSO 039K001
# Tributary Area Map
# Bells Run
# Sewershed

CSO Controls Alternatives

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Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | A relief sewer will not be evaluated. |
| Sewer separation | Y | Sewer separation within the 321 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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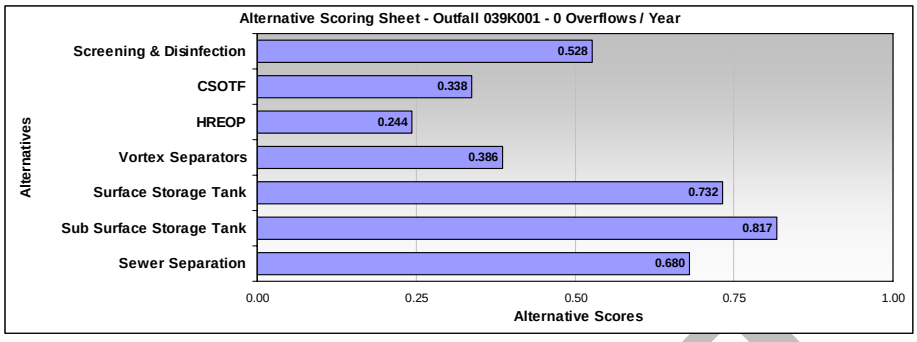
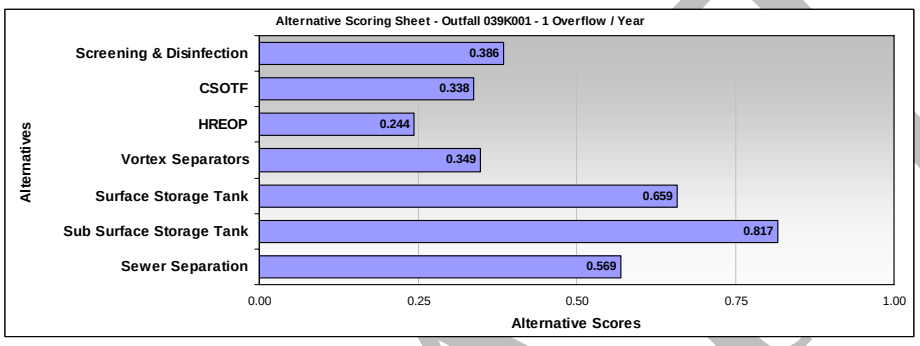
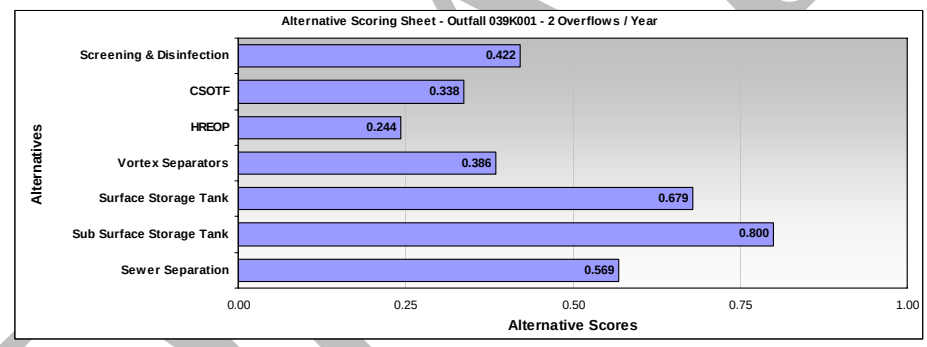
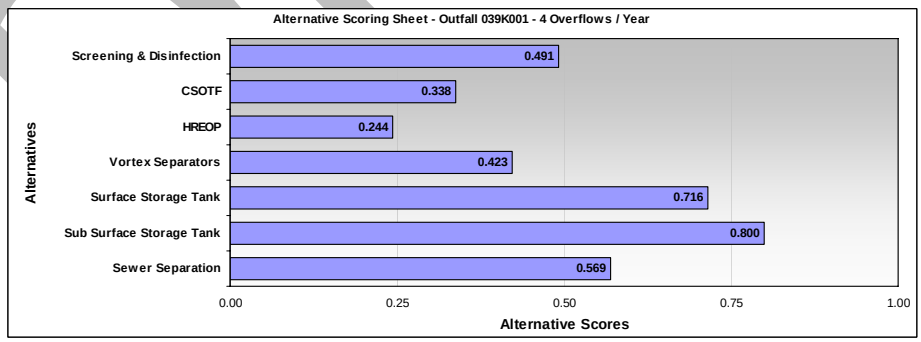
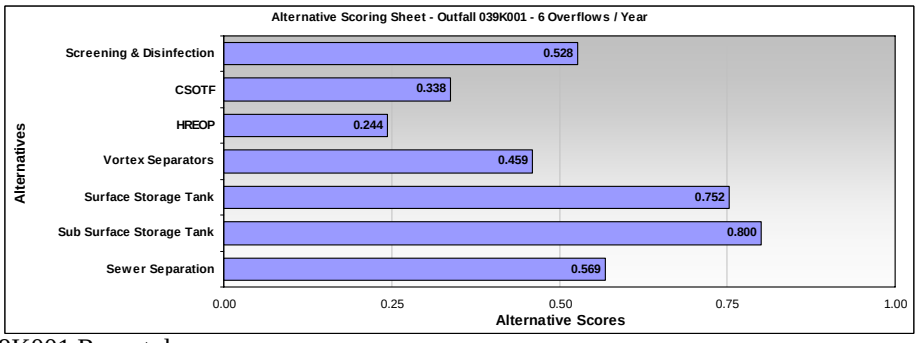
# Attachment 3 – Alternative Scoring Sheet

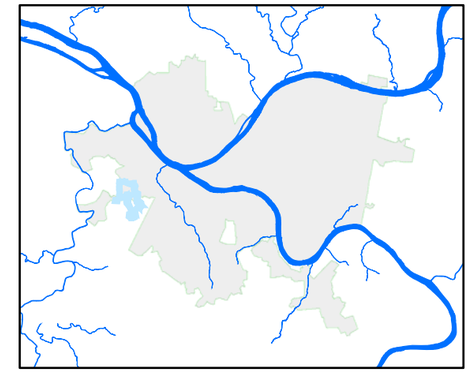




Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- Trunk Sewer
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# CSO 039K001
# Facilities Boundary Map
# Bells Run
# Sewershed

CSO Controls Alternatives

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 4 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 4 | 3 | 3 | 3 | 3 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 2 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.679** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.679** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.780** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.622** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.610** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

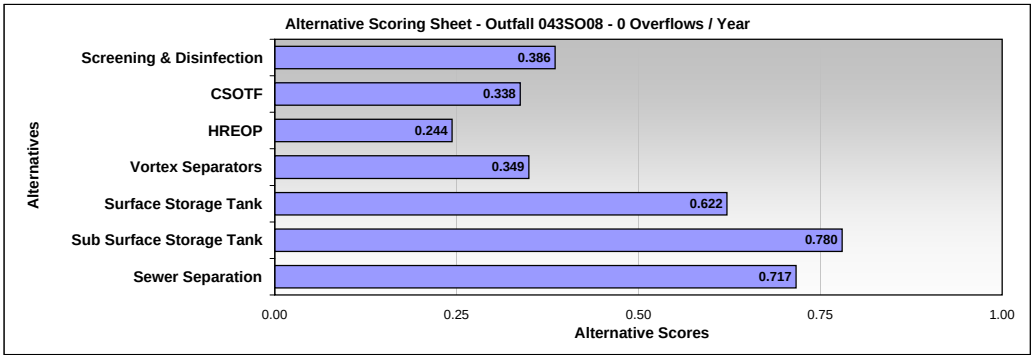
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

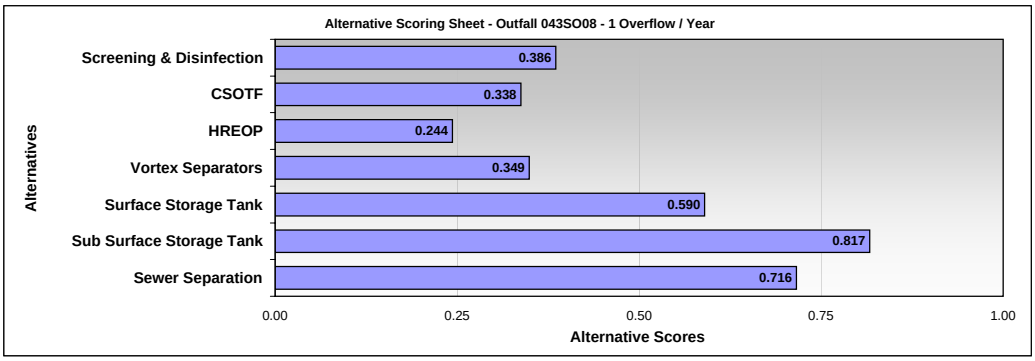
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

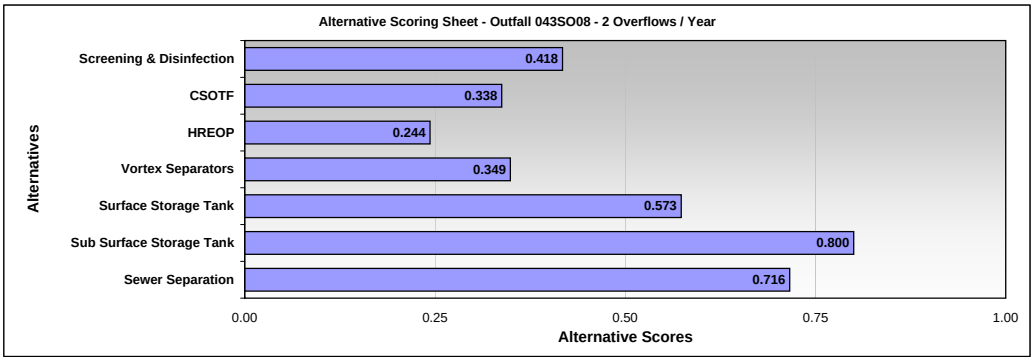
Total Score

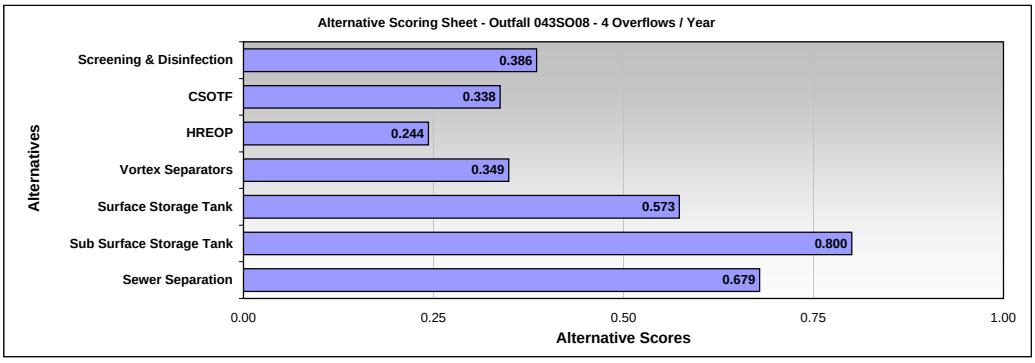
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

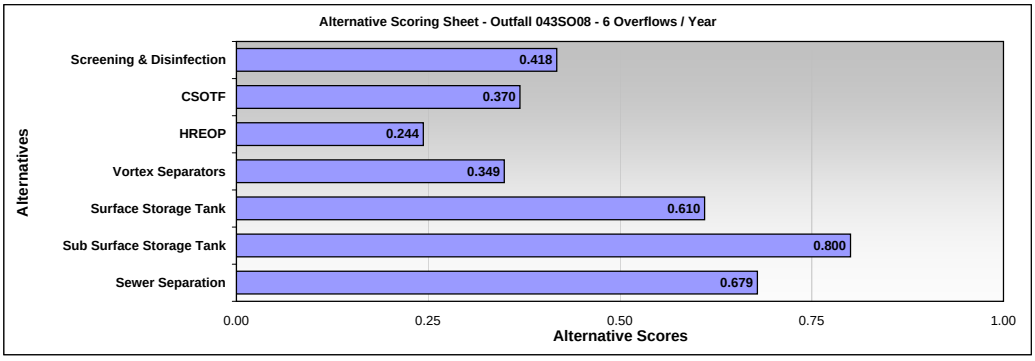
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |


Alternative Scoring Sheet - Outfall 043SO08 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.622
0.780
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 043SO08 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.590
0.817
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 043SO08 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.800
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 043SO08 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.573
0.800
0.679
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 043SO08 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.370
0.244
0.349
0.610
0.800
0.679
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 19 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 8,276 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **17,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,906,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.15 | 20,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.18 | 24,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 50 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 34 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.19 | 25,500 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **121,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 8.76 | 13.55 | = Peak Rate |
| Force Main Diameter (In) | | 20 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,682,000** | **$ 28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 13.55 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 36,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 180 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **24,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 8.76 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **818,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,817,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.15 | | 20,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.18 | | 24,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 50 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 34 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.19 | | 25,500 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,382,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.15 | | 0.24 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 414,000** | | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 13.55 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 36,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,800 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 145,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 8.76 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 818,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 42,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **2,917,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.76 | | 13.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,137,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 9.63 | | 14.90 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 21 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,772,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.55 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 8.76 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **818,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 9.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 49 | | 24 | |
| Passes / Detention (Min) | | 3 | | 15.78 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **539,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 9,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,797,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.76 | | 13.55 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,500 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 56 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 28 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.14 | | 18,816 | |
| **Construction Cost (CSOTF)** | **$** | **16,384,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.76 | | 13.55 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 20 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,682,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.55 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 28,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **119,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 8.76 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **818,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 8.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | | 23 | |
| Passes / Detention (Min) | | 3 | | **15.96** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **521,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 8,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **20,670,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.76 | | 13.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 110 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 16 | | **OK** | Input by Engineer |
| Width (Ft) | | 8 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,575,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 9.63 | | 14.90 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 21 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,772,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.55 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 8.76 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **818,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 9.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 49 | | 24 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.78** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 539,000 | $ | 410,000 | |
| **Construction Cost (Disinfection)** | **$** | **949,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 26,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,318,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 20,332 | CF |
| | 0.15 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 13.55 | CFS |
| | 8.76 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 8.76 | | 13.55 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **818,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 8.76 | | 13.55 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 20 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,682,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.55 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 140 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **20,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 8.76 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | | 23 | |
| Passes / Detention (Min) | | 3 | | **15.96** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 521,000 | $ | 392,000 | |
| **Construction Cost (Disinfection)** | **$** | **913,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,609,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 19 | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **2,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 8,276 | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **17,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **2,906,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.09 | 13,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.11 | 15,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 40 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 27 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.12 | 16,200 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **72,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 7.11 | 11.00 | = Peak Rate |
| Force Main Diameter (In) | | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,491,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.00 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 120 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **17,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 7.11 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **741,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,491,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.09 | | 13,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.11 | | 15,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 40 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 27 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.12 | | 16,200 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,203,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.09 | | 0.15 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **364,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 11.00 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 23,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **102,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 7.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **741,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,567,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.11 | 11.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.82 | 12.10 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,577,000** | **$ 27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.00 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.11 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **741,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 7.82 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 45 | 21 | |
| Passes | | 3 | **15.62** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **502,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 7,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 4,223,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.11 | 11.00 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,200 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 50 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 25 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.11 | 15,000 | |
| **Construction Cost (CSOTF)** | **$** | **16,386,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.11 | 11.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,491,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.00 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **102,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.11 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **741,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 7.11 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | 20 | |
| Passes | | 3 | **15.64** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **487,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 8,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **20,351,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.11 | | 11.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 90 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 14 | | **OK** | Input by Engineer |
| Width (Ft) | | 7 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,315,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.82 | | 12.10 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,577,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 7.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **741,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 7.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 45 | | 21 | Input by Engineer |
| Passes | | 3 | | **15.62** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 502,000 | $ | 367,000 | |
| **Construction Cost (Disinfection)** | **$** | **869,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **6,696,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,554 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 11.00 | CFS |
| | 7.11 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **1 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 7.11 | | 11.00 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **741,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 7.11 | | 11.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,491,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.00 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 110 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **16,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 7.11 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | | 20 | |
| Passes | | 3 | | **15.64** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 487,000 | $ | 350,000 | |
| **Construction Cost (Disinfection)** | **$** | **837,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,259,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 19 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 8,276 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **17,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,906,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.09 | | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.10 | | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 38 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 26 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.11 | | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **66,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 5.15 | | 7.96 | = Peak Rate |
| Force Main Diameter (In) | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,225,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 21,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 110 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **16,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,125,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.09 | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 38 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 26 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.11 | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,183,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.09 | 0.13 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 2 | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **359,000** | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.96 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 21,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,050 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **95,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,443,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | 7.96 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.66 | 8.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,299,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.96 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.66 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | 18 | |
| Passes | | 3 | **15.62** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **457,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,804,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | 7.96 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 43 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 22 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | 11,352 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.15 | 7.96 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,225,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.96 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **81,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.15 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | 18 | |
| Passes | | 3 | **16.27** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **446,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,934,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | | 7.96 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 70 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 13 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,007,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.66 | | 8.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,299,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.66 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | | 18 | Input by Engineer |
| Passes | | 3 | | **15.62** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 457,000 | $ | 311,000 | |
| **Construction Cost (Disinfection)** | **$** | **768,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,915,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,653 | CF |
| | 0.09 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 5.15 | | 7.96 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 5.15 | | 7.96 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,225,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.96 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 5.15 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | | 18 | |
| Passes | | 3 | | **16.27** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 446,000 | $ | 301,000 | |
| **Construction Cost (Disinfection)** | **$** | **747,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,809,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 19 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 8,276 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **17,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,906,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **27,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 4.81 | | 7.44 | = Peak Rate |
| Force Main Diameter (In) | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,175,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.44 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 50 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **9,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 4.81 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **635,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,012,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,032,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 10.9 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **317,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.44 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **49,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 4.81 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **635,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,187,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 4 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.81 | 7.44 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.29 | 8.18 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,246,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.44 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.81 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **635,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.29 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | 18 | |
| Passes | | 3 | **16.28** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **449,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,727,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.81 | 7.44 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 43 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 22 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | 11,352 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.81 | 7.44 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,175,000** | **$ 24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.44 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **81,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.81 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **635,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.81 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | 17 | |
| Passes | | 3 | **16.00** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **439,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,860,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.81 | | 7.44 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 60 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 12 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,954,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.29 | | 8.18 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,246,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.44 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.81 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **635,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.29 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | | 18 | Input by Engineer |
| Passes | | 3 | | **16.28** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 449,000 | $ | 306,000 | |
| **Construction Cost (Disinfection)** | **$** | **755,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,780,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 5,128 | CF |
| | 0.04 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 7.44 | CFS |
| | 4.81 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.81 | | 7.44 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **635,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.81 | | 7.44 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,175,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.44 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.81 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 17 | |
| Passes | | 3 | | **16.00** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 439,000 | $ | 291,000 | |
| **Construction Cost (Disinfection)** | **$** | **730,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,725,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 19 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 8,276 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **17,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,906,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.03 | | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.04 | | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 23 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 16 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.04 | | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **23,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.61 | | 4.04 | = Peak Rate |
| Force Main Diameter (In) | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,818,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.04 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 8,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 40 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **7,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,543,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.03 | | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.04 | | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 23 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 16 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.04 | | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,016,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.03 | | 0.05 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 9.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **313,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.04 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 8,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **45,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,061,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 6 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | 4.04 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.87 | 4.44 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,863,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.04 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.61 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.87 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | 13 | |
| Passes | | 3 | **15.80** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **398,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,183,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | 4.04 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.61 | 4.04 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,818,000** | **$ 20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.04 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.61 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.61 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | 13 | |
| Passes | | 3 | **16.73** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **393,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,325,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | | 4.04 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | OK | Input by Engineer |
| Width (Ft) | | 5 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,609,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 2.87 | | 4.44 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.7 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,863,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.04 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.87 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | Input by Engineer |
| Passes | | 3 | | 15.80 | Input by Engineer / 12' SWD Basis |
| | | | | OK Detn Time | |
| Construction Cost (Disinfection / CC Tank) | $ | 398,000 | $ | 232,000 | |
| **Construction Cost (Disinfection)** | **$** | **630,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,813,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 31 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 4,413 | CF |
| | 0.03 | MG |
| Total Volume | 101,482 | CF |
| | 0.76 | MG |
| Peak Rate | 4.04 | CFS |
| | 2.61 | MGD |

| Capital Costs - 043SO08 / Sewershed ACSO 043SO08 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.61 | | 4.04 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.61 | | 4.04 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,818,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.04 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.61 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | |
| Passes | | 3 | | **16.73** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 393,000 | $ | 227,000 | |
| **Construction Cost (Disinfection)** | **$** | **620,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,146,000** | | | |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 8.76 | $80,099 | 20 | 10.910 | $873,876 |
| | Tank O&M | No. Events / Yr | 31 | $19,349 | 50 | 14.484 | $280,242 |
| | | Const Cost ($) | $121,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 9 | $8,175 | 20 | 10.910 | $89,192 |
| | Odor Control O&M | Capacity (cfm) | 180 | $630 | 20 | 10.910 | $6,873 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,233 |
| | | | **Total Annual O&M** | **$109,000** | | **Total PW O&M** | **$1,263,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.15 | $5,341 | 20 | 10.910 | $58,273 |
| | Tank O&M | No. Events / Yr | 31 | $22,501 | 50 | 14.484 | $325,901 |
| | | Const Cost ($) | $1,382,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 9 | $8,175 | 20 | 10.910 | $89,192 |
| | Odor Control O&M | Capacity (cfm) | 1,800 | $6,300 | 20 | 10.910 | $68,733 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,308 |
| | | | **Total Annual O&M** | **$43,000** | | **Total PW O&M** | **$546,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 8.76 | $80,099 | 20 | 10.910 | $873,876 |
| | Sed. Basin O&M | Flow Rate (mgd) | 8.76 | $985 | 50 | 14.484 | $14,266 |
| | Screening O&M | Flow Rate (mgd) | 8.76 | $8,175 | 20 | 10.910 | $89,192 |
| | Disinfection O&M | Flow Rate (mgd) | 8.76 | $60,301 | 20 | 10.910 | $657,880 |
| | Odor Control O&M | Capacity (cfm) | 1,400.00 | $4,900 | 20 | 10.910 | $53,459 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,908 |
| | | | **Total Annual O&M** | **$155,000** | | **Total PW O&M** | **$1,704,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 9.63 | $85,365 | 20 | 10.910 | $931,331 |
| | HREP O&M | Flow Rate (mgd) | 8.76 | $83,438 | 20 | 10.910 | $910,302 |
| | Screening O&M | Flow Rate (mgd) | 8.76 | $8,175 | 20 | 10.910 | $89,192 |
| | Disinfection O&M | Flow Rate (mgd) | 9.63 | $63,906 | 20 | 10.910 | $697,210 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,062 |
| | | | **Total Annual O&M** | **$242,000** | | **Total PW O&M** | **$2,656,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 9.63 | $85,365 | 20 | 10.910 | $931,331 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 8.76 | $985 | 20 | 10.910 | $10,746 |
| | Screening O&M | Flow Rate (mgd) | 8.76 | $8,175 | 20 | 10.910 | $89,192 |
| | Disinfection O&M | Flow Rate (mgd) | 9.63 | $63,906 | 20 | 10.910 | $697,210 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,879 |
| | | | **Total Annual O&M** | **$164,000** | | **Total PW O&M** | **$1,801,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 8.76 | $80,099 | 20 | 10.910 | $873,876 |
| | Screening O&M | Flow Rate (mgd) | 8.76 | $8,175 | 20 | 10.910 | $89,192 |
| | Disinfection O&M | Flow Rate (mgd) | 8.76 | $60,301 | 20 | 10.910 | $657,880 |
| | Odor Control O&M | Capacity (cfm) | 140.00 | $490 | 20 | 10.910 | $5,346 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,639 |
| | | | **Total Annual O&M** | **$150,000** | | **Total PW O&M** | **$1,641,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 7.11 | $69,687 | 20 | 10.910 | $760,285 |
| | Tank O&M | No. Events / Yr | 31 | $19,226 | 50 | 14.484 | $278,467 |
| | | Const Cost ($) | $72,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $8,034 | 20 | 10.910 | $87,650 |
| | Odor Control O&M | Capacity (cfm) | 120 | $420 | 20 | 10.910 | $4,582 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,225 |
| | | | **Total Annual O&M** | **$98,000** | | **Total PW O&M** | **$1,143,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.09 | $3,870 | 20 | 10.910 | $42,223 |
| | Tank O&M | No. Events / Yr | 31 | $22,054 | 50 | 14.484 | $319,420 |
| | | Const Cost ($) | $1,203,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $8,034 | 20 | 10.910 | $87,650 |
| | Odor Control O&M | Capacity (cfm) | 1,150 | $4,025 | 20 | 10.910 | $43,913 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,778 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$497,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 7.11 | $69,687 | 20 | 10.910 | $760,285 |
| | Sed. Basin O&M | Flow Rate (mgd) | 7.11 | $800 | 50 | 14.484 | $11,582 |
| | Screening O&M | Flow Rate (mgd) | 7.11 | $8,034 | 20 | 10.910 | $87,650 |
| | Disinfection O&M | Flow Rate (mgd) | 7.11 | $53,111 | 20 | 10.910 | $579,435 |
| | Odor Control O&M | Capacity (cfm) | 1,150.00 | $4,025 | 20 | 10.910 | $43,913 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,781 |
| | | | **Total Annual O&M** | **$136,000** | | **Total PW O&M** | **$1,497,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 7.82 | $74,269 | 20 | 10.910 | $810,272 |
| | HREP O&M | Flow Rate (mgd) | 7.11 | $73,813 | 20 | 10.910 | $805,291 |
| | Screening O&M | Flow Rate (mgd) | 7.11 | $8,034 | 20 | 10.910 | $87,650 |
| | Disinfection O&M | Flow Rate (mgd) | 7.82 | $56,286 | 20 | 10.910 | $614,075 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,233 |
| | | | **Total Annual O&M** | **$213,000** | | **Total PW O&M** | **$2,341,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 7.82 | $74,269 | 20 | 10.910 | $810,272 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 7.11 | $800 | 20 | 10.910 | $8,725 |
| | Screening O&M | Flow Rate (mgd) | 7.11 | $8,034 | 20 | 10.910 | $87,650 |
| | Disinfection O&M | Flow Rate (mgd) | 7.82 | $56,286 | 20 | 10.910 | $614,075 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,895 |
| | | | **Total Annual O&M** | **$140,000** | | **Total PW O&M** | **$1,535,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 7.11 | $69,687 | 20 | 10.910 | $760,285 |
| | Screening O&M | Flow Rate (mgd) | 7.11 | $8,034 | 20 | 10.910 | $87,650 |
| | Disinfection O&M | Flow Rate (mgd) | 7.11 | $53,111 | 20 | 10.910 | $579,435 |
| | Odor Control O&M | Capacity (cfm) | 110.00 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,547 |
| | | | **Total Annual O&M** | **$132,000** | | **Total PW O&M** | **$1,445,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,163 | 20 | 10.910 | $612,739 |
| | Tank O&M | No. Events / Yr | 31 | $19,211 | 50 | 14.484 | $278,250 |
| | | Const Cost ($) | $66,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,867 | 20 | 10.910 | $85,828 |
| | Odor Control O&M | Capacity (cfm) | 110 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,892 |
| | | | **Total Annual O&M** | **$84,000** | | **Total PW O&M** | **$992,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.09 | $3,682 | 20 | 10.910 | $40,176 |
| | Tank O&M | No. Events / Yr | 31 | $22,004 | 50 | 14.484 | $318,696 |
| | | Const Cost ($) | $1,183,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,867 | 20 | 10.910 | $85,828 |
| | Odor Control O&M | Capacity (cfm) | 1,050 | $3,675 | 20 | 10.910 | $40,094 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,494 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$488,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,163 | 20 | 10.910 | $612,739 |
| | Sed. Basin O&M | Flow Rate (mgd) | 5.15 | $579 | 50 | 14.484 | $8,386 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.15 | $43,626 | 20 | 10.910 | $475,954 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,282 |
| | | | **Total Annual O&M** | **$112,000** | | **Total PW O&M** | **$1,228,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.66 | $59,856 | 20 | 10.910 | $653,026 |
| | HREP O&M | Flow Rate (mgd) | 5.15 | $61,045 | 20 | 10.910 | $665,998 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.66 | $46,234 | 20 | 10.910 | $504,407 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,894 |
| | | | **Total Annual O&M** | **$176,000** | | **Total PW O&M** | **$1,931,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.66 | $59,856 | 20 | 10.910 | $653,026 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 5.15 | $579 | 20 | 10.910 | $6,317 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.66 | $46,234 | 20 | 10.910 | $504,407 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,394 |
| | | | **Total Annual O&M** | **$115,000** | | **Total PW O&M** | **$1,262,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,163 | 20 | 10.910 | $612,739 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.15 | $43,626 | 20 | 10.910 | $475,954 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,097 |
| | | | **Total Annual O&M** | **$108,000** | | **Total PW O&M** | **$1,190,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.81 | $53,661 | 20 | 10.910 | $585,442 |
| | Tank O&M | No. Events / Yr | 31 | $19,114 | 50 | 14.484 | $276,838 |
| | | Const Cost ($) | $27,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,838 | 20 | 10.910 | $85,514 |
| | Odor Control O&M | Capacity (cfm) | 50 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,626 |
| | | | **Total Annual O&M** | **$81,000** | | **Total PW O&M** | **$960,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,128 | 20 | 10.910 | $23,214 |
| | Tank O&M | No. Events / Yr | 31 | $21,626 | 50 | 14.484 | $313,228 |
| | | Const Cost ($) | $1,032,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,838 | 20 | 10.910 | $85,514 |
| | Odor Control O&M | Capacity (cfm) | 450 | $1,575 | 20 | 10.910 | $17,183 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,154 |
| | | | **Total Annual O&M** | **$34,000** | | **Total PW O&M** | **$442,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.81 | $53,661 | 20 | 10.910 | $585,442 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.81 | $541 | 50 | 14.484 | $7,833 |
| | Screening O&M | Flow Rate (mgd) | 4.81 | $7,838 | 20 | 10.910 | $85,514 |
| | Disinfection O&M | Flow Rate (mgd) | 4.81 | $41,850 | 20 | 10.910 | $456,581 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,016 |
| | | | **Total Annual O&M** | **$107,000** | | **Total PW O&M** | **$1,180,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.29 | $57,189 | 20 | 10.910 | $623,933 |
| | HREP O&M | Flow Rate (mgd) | 4.81 | $58,645 | 20 | 10.910 | $639,809 |
| | Screening O&M | Flow Rate (mgd) | 4.81 | $7,838 | 20 | 10.910 | $85,514 |
| | Disinfection O&M | Flow Rate (mgd) | 5.29 | $44,352 | 20 | 10.910 | $483,876 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,468 |
| | | | **Total Annual O&M** | **$169,000** | | **Total PW O&M** | **$1,854,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.29 | $57,189 | 20 | 10.910 | $623,933 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.81 | $541 | 20 | 10.910 | $5,900 |
| | Screening O&M | Flow Rate (mgd) | 4.81 | $7,838 | 20 | 10.910 | $85,514 |
| | Disinfection O&M | Flow Rate (mgd) | 5.29 | $44,352 | 20 | 10.910 | $483,876 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,112 |
| | | | **Total Annual O&M** | **$110,000** | | **Total PW O&M** | **$1,211,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.81 | $53,661 | 20 | 10.910 | $585,442 |
| | Screening O&M | Flow Rate (mgd) | 4.81 | $7,838 | 20 | 10.910 | $85,514 |
| | Disinfection O&M | Flow Rate (mgd) | 4.81 | $41,850 | 20 | 10.910 | $456,581 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,831 |
| | | | **Total Annual O&M** | **$104,000** | | **Total PW O&M** | **$1,142,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,692 | 20 | 10.910 | $389,402 |
| | Tank O&M | No. Events / Yr | 31 | $19,104 | 50 | 14.484 | $276,693 |
| | | Const Cost ($) | $23,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,653 | 20 | 10.910 | $83,496 |
| | Odor Control O&M | Capacity (cfm) | 40 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,886 |
| | | | **Total Annual O&M** | **$63,000** | | **Total PW O&M** | **$760,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.03 | $1,925 | 20 | 10.910 | $21,001 |
| | Tank O&M | No. Events / Yr | 31 | $21,586 | 50 | 14.484 | $312,649 |
| | | Const Cost ($) | $1,016,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,653 | 20 | 10.910 | $83,496 |
| | Odor Control O&M | Capacity (cfm) | 400 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,849 |
| | | | **Total Annual O&M** | **$33,000** | | **Total PW O&M** | **$435,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,692 | 20 | 10.910 | $389,402 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.61 | $294 | 50 | 14.484 | $4,255 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,496 |
| | Disinfection O&M | Flow Rate (mgd) | 2.61 | $28,855 | 20 | 10.910 | $314,807 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,080 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$821,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.87 | $38,039 | 20 | 10.910 | $415,004 |
| | HREP O&M | Flow Rate (mgd) | 2.61 | $40,959 | 20 | 10.910 | $446,858 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,496 |
| | Disinfection O&M | Flow Rate (mgd) | 2.87 | $30,580 | 20 | 10.910 | $333,626 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,534 |
| | | | **Total Annual O&M** | **$118,000** | | **Total PW O&M** | **$1,295,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.87 | $38,039 | 20 | 10.910 | $415,004 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.61 | $294 | 20 | 10.910 | $3,205 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,496 |
| | Disinfection O&M | Flow Rate (mgd) | 2.87 | $30,580 | 20 | 10.910 | $333,626 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,133 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$845,000** |

| ACSO 043SO08 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,692 | 20 | 10.910 | $389,402 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,496 |
| | Disinfection O&M | Flow Rate (mgd) | 2.61 | $28,855 | 20 | 10.910 | $314,807 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,955 |
| | | | **Total Annual O&M** | **$73,000** | | **Total PW O&M** | **$799,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.9 | $2,906,000 | $0 |
| 1 | $2.9 | $2,906,000 | $0 |
| 2 | $2.9 | $2,906,000 | $0 |
| 4 | $2.9 | $2,906,000 | $0 |
| 6 | $2.9 | $2,906,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.5 | $2,917,000 | $546,000 |
| 1 | $3.1 | $2,567,000 | $497,000 |
| 2 | $2.9 | $2,443,000 | $488,000 |
| 4 | $2.6 | $2,187,000 | $442,000 |
| 6 | $2.5 | $2,061,000 | $435,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.1 | $3,817,000 | $1,263,000 |
| 1 | $4.6 | $3,491,000 | $1,143,000 |
| 2 | $4.1 | $3,125,000 | $992,000 |
| 4 | $4.0 | $3,012,000 | $960,000 |
| 6 | $3.3 | $2,543,000 | $760,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.6 | $5,797,000 | $1,801,000 |
| 1 | $5.8 | $4,223,000 | $1,535,000 |
| 2 | $5.1 | $3,804,000 | $1,262,000 |
| 4 | $4.9 | $3,727,000 | $1,211,000 |
| 6 | $4.0 | $3,183,000 | $845,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $10.0 | $7,318,000 | $2,656,000 |
| 1 | $9.0 | $6,696,000 | $2,341,000 |
| 2 | $7.8 | $5,915,000 | $1,931,000 |
| 4 | $7.6 | $5,780,000 | $1,854,000 |
| 6 | $6.1 | $4,813,000 | $1,295,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $22.4 | $20,670,000 | $1,704,000 |
| 1 | $21.8 | $20,351,000 | $1,497,000 |
| 2 | $21.2 | $19,934,000 | $1,228,000 |
| 4 | $21.0 | $19,860,000 | $1,180,000 |
| 6 | $20.1 | $19,325,000 | $821,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.3 | $4,609,000 | $1,641,000 |
| 1 | $5.7 | $4,259,000 | $1,445,000 |
| 2 | $5.0 | $3,809,000 | $1,190,000 |
| 4 | $4.9 | $3,725,000 | $1,142,000 |
| 6 | $3.9 | $3,146,000 | $799,000 |

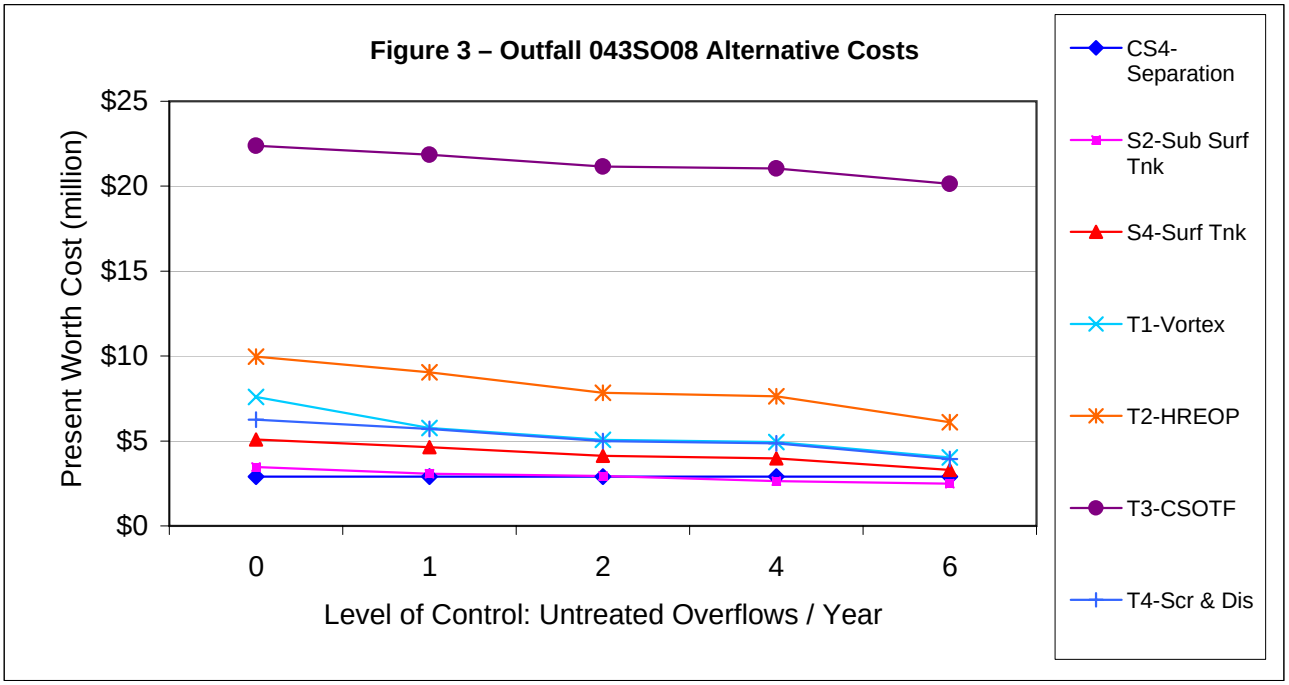
Figure 3 – Outfall 043SO08 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 043SO08 |
| **Location Name** | Bixby Way (W. Carson Street) |
| **Model ID** | ADC 043S008.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 043SO08 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 31 | |
| Peak Volume: | 20,332 | $ft^3$ |
| | 0.15 | MG |
| Total Volume: | 101,482 | $ft^3$ |
| | 0.76 | MG |
| Peak Rate: | 13.55 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 7/12/2005 19:35 | 64 | 7/12/2005 20:00 | 20332.34 | 152.096 | 0 | 13.55 | 0 |
| 8/20/2005 18:15 | 63 | 8/20/2005 18:30 | 12553.53 | 93.907 | 1 | 7.73 | 3 |
| 7/5/2005 16:15 | 39 | 7/5/2005 16:30 | 11653.40 | 87.173 | 2 | 11.00 | 1 |
| 6/11/2005 17:40 | 30 | 6/11/2005 18:00 | 6754.27 | 50.525 | 3 | 7.44 | 4 |
| 5/14/2005 16:01 | 33 | 5/14/2005 16:15 | 5127.51 | 38.356 | 4 | 7.96 | 2 |
| 5/13/2005 23:10 | 99 | 5/13/2005 23:45 | 5039.21 | 37.696 | 5 | 1.90 | 11 |
| 11/14/2005 22:50 | 325 | 11/15/2005 3:45 | 4413.46 | 33.015 | 6 | 1.52 | 13 |
| 11/29/2005 8:25 | 233 | 11/29/2005 11:15 | 4158.44 | 31.107 | 7 | 1.25 | 15 |
| 1/11/2005 9:20 | 524 | 1/11/2005 9:45 | 3419.52 | 25.580 | 8 | 0.62 | 22 |
| 5/23/2005 16:20 | 15 | 5/23/2005 16:30 | 2695.25 | 20.162 | 9 | 4.53 | 5 |
| 7/26/2005 19:45 | 20 | 7/26/2005 20:00 | 2617.87 | 19.583 | 10 | 2.99 | 8 |
| 11/9/2005 19:20 | 15 | 11/9/2005 19:30 | 2392.65 | 17.898 | 11 | 4.04 | 6 |
| 1/5/2005 14:15 | 799 | 1/5/2005 14:45 | 2006.46 | 15.009 | 12 | 0.64 | 21 |
| 3/24/2005 9:35 | 15 | 3/24/2005 9:45 | 1966.18 | 14.708 | 13 | 3.54 | 7 |
| 8/29/2005 12:50 | 30 | 8/29/2005 13:00 | 1964.01 | 14.692 | 14 | 2.17 | 9 |
| 1/12/2005 1:05 | 149 | 1/12/2005 1:30 | 1834.18 | 13.721 | 15 | 1.08 | 18 |
| 4/23/2005 3:30 | 79 | 4/23/2005 3:40 | 1677.50 | 12.549 | 16 | 1.79 | 12 |
| 1/8/2005 5:00 | 49 | 1/8/2005 5:15 | 1659.23 | 12.412 | 17 | 1.14 | 17 |
| 7/15/2005 18:00 | 40 | 7/15/2005 18:15 | 1600.13 | 11.970 | 18 | 1.51 | 14 |
| 10/25/2005 2:17 | 123 | 10/25/2005 4:00 | 1397.11 | 10.451 | 19 | 0.47 | 25 |
| 9/29/2005 5:31 | 19 | 9/29/2005 5:40 | 1216.66 | 9.101 | 20 | 1.97 | 10 |
| 4/2/2005 6:20 | 224 | 4/2/2005 6:30 | 1153.17 | 8.626 | 21 | 0.59 | 23 |
| 5/11/2005 23:30 | 35 | 5/11/2005 23:45 | 873.12 | 6.531 | 22 | 0.66 | 20 |
| 12/15/2005 13:50 | 24 | 12/15/2005 14:00 | 818.50 | 6.123 | 23 | 1.25 | 16 |
| 3/28/2005 10:00 | 113 | 3/28/2005 10:15 | 608.51 | 4.552 | 24 | 0.27 | 26 |
| 1/3/2005 13:06 | 434 | 1/3/2005 13:15 | 558.40 | 4.177 | 25 | 0.19 | 27 |
| 2/9/2005 16:25 | 24 | 2/9/2005 16:45 | 555.45 | 4.155 | 26 | 0.58 | 24 |
| 2/20/2005 19:55 | 25 | 2/20/2005 20:00 | 338.14 | 2.529 | 27 | 0.71 | 19 |
| 1/14/2005 1:52 | 11 | 1/14/2005 2:00 | 34.93 | 0.261 | 28 | 0.07 | 30 |
| 10/7/2005 10:53 | 10 | 10/7/2005 11:00 | 31.80 | 0.238 | 29 | 0.07 | 29 |
| 3/23/2005 12:41 | 7 | 3/23/2005 12:45 | 31.19 | 0.233 | 30 | 0.11 | 28 |



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# Region 1

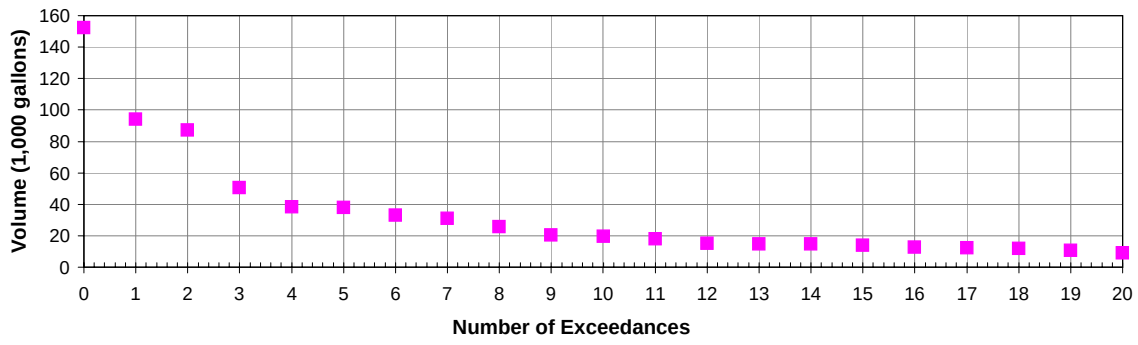
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 043SO08 |
| **Location Name** | Bixby Way (W. Carson Street) |
| **Model ID** | ADC 043S008.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 043SO08 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

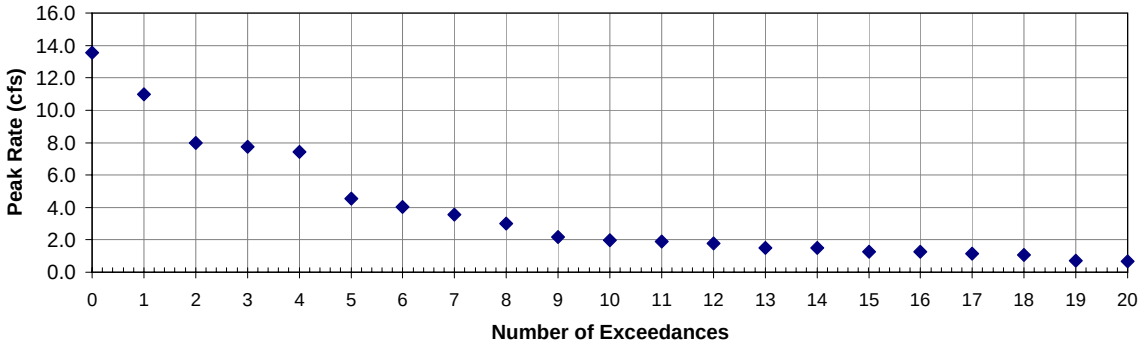
**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 31 | |
| Peak Volume: | 20,332 | $ft^3$ |
| | 0.15 | MG |
| Total Volume: | 101,482 | $ft^3$ |
| | 0.76 | MG |
| Peak Rate: | 13.55 | cfs |

### Figure 1 - Outfall 043S0O8 CSO Volume




### Figure 2 - Outfall 043S0O8 CSO Peak Flow Rate



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## D.25.1 O-8 – GLEN MAWR SEWERSHED – NPDES# 043SO08

### Description of Outfall

Outfall 043SO08 conveys overflows from the ALCOSAN diversion chamber O-8 to the Ohio River. The outfall is located along east of West Carson Street south of Corks Run in the City of Pittsburgh. The outfall is located approximately 200 feet east of West Carson Street. The tributary sewershed is 19 acres of residential, business and commercial users. The outfall is located within the Glen Mawr sewershed, which is located entirely in the City of Pittsburgh, and is comprised of approximately 540 manholes and 135,718 linear feet (25.7 miles) of mostly combined sewer up to 120 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 043SO08 typically experiences 31 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 043SO08 is approximately 0.15 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 043SO08 is approximately 13.55 CFS. *Figure 1 – Outfall 043SO08 CSO Volume* and *Figure 2 – Outfall 043SO08 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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**Figure 1 - Outfall 043S0O8 CSO Volume**

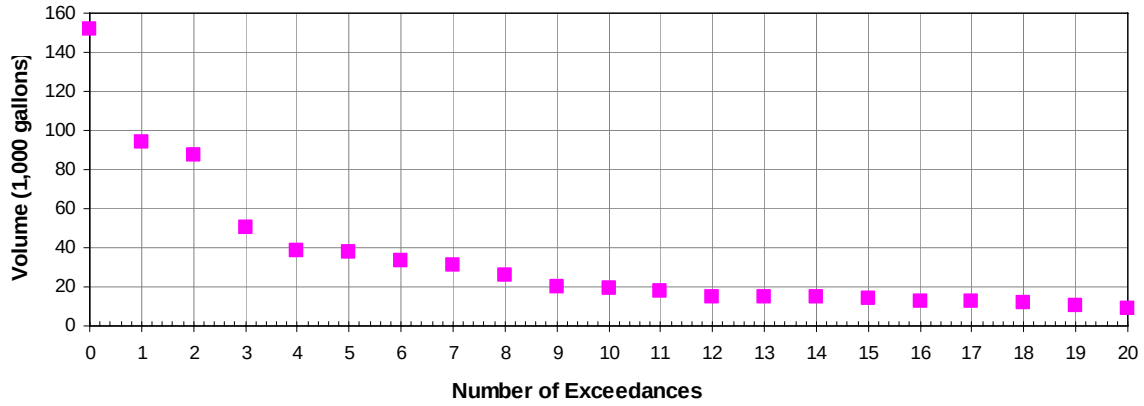
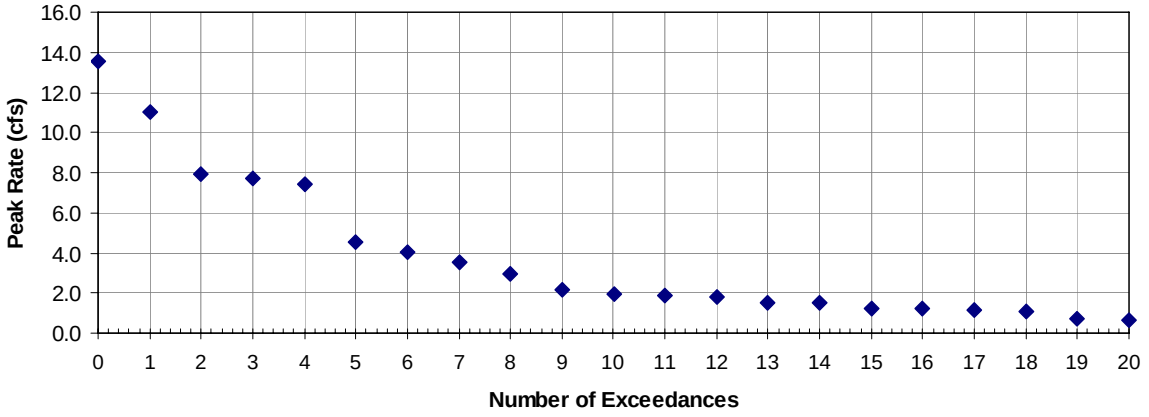



**Figure 2 - Outfall 043S0O8 CSO Peak Flow Rate**





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There appears to be available space for potential storage or treatment facilities to the east of Carson Street, adjacent to the outfall. The site is generally bounded by the Ohio River to the east, Carson Street and railroad tracks to the west and vacant, unimproved property to the north and south (near the bank of the Ohio River). Due to the limited CSO volume and flow rates, it appears the facility could be located between the railroad tracks and the river.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 043SO08. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-043SO08: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-043SO08: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

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S4-043SO08: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-043SO08: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-043SO08: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-043SO08: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

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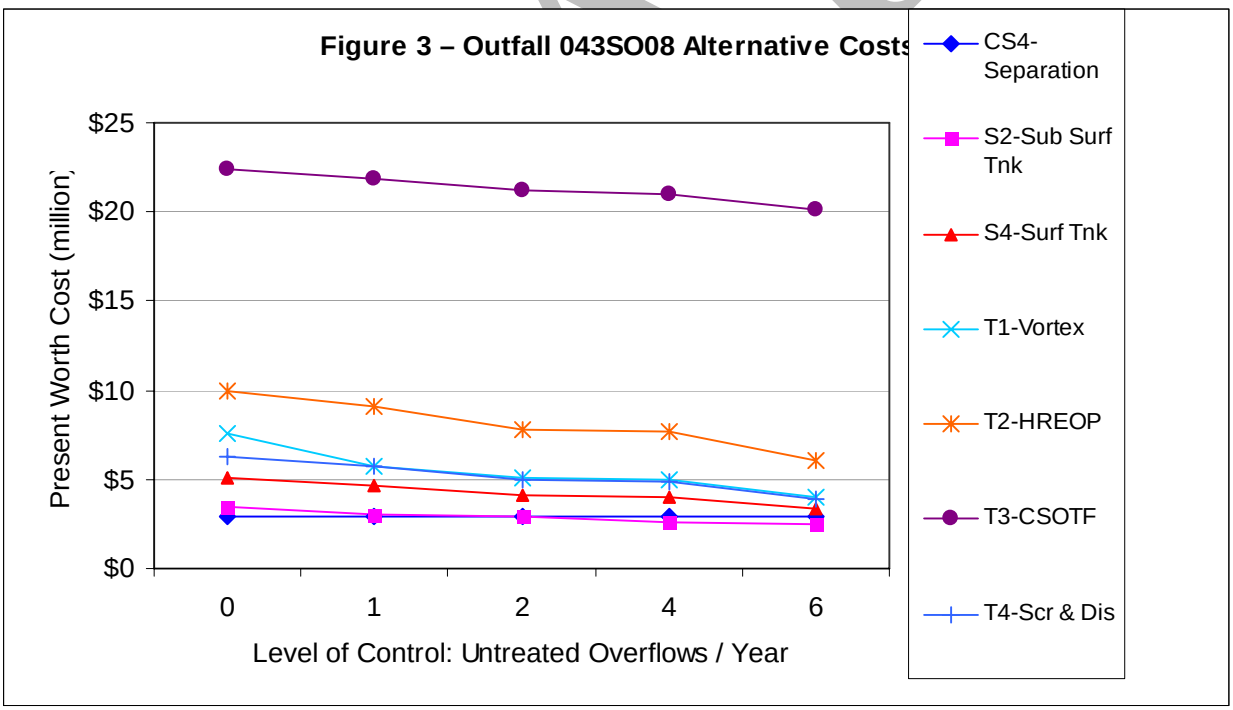
T4-043SO08: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 043SO08 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.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*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 though 6, it is recommended that Alternative S2-043SO08: Sub-Surface Storage Facility be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. Separation scored a close second in all control levels.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

The PWSA may consider separation in this area due to its high ranking at all control levels. Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

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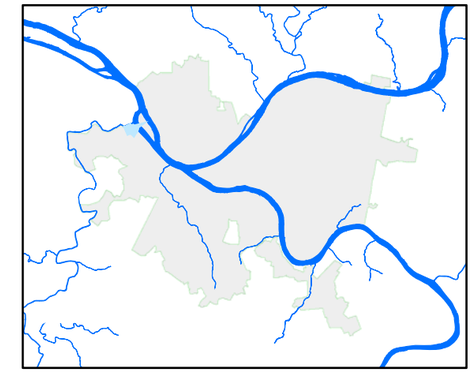

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

200 0 200
Feet

# Attachment 1
# O-8
# Tributary Area Map
# Glen Mawr Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

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# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 19 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening in conjunction with storage and treatment alternatives will be evaluated. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection in conjunction with treatment alternatives will be evaluated. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation will be evaluated and will include screening and disinfection. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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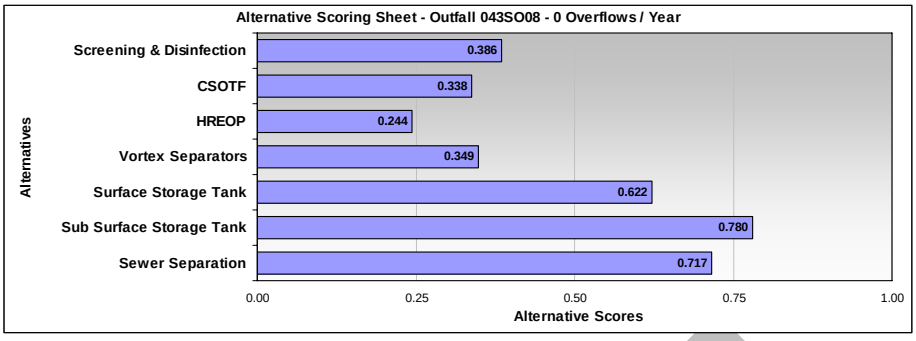
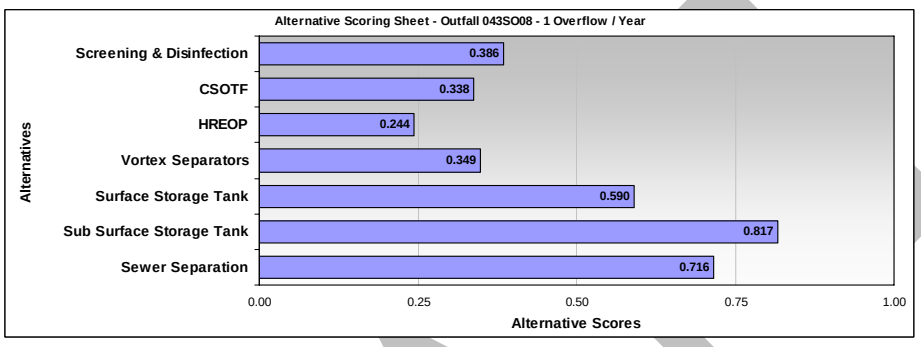
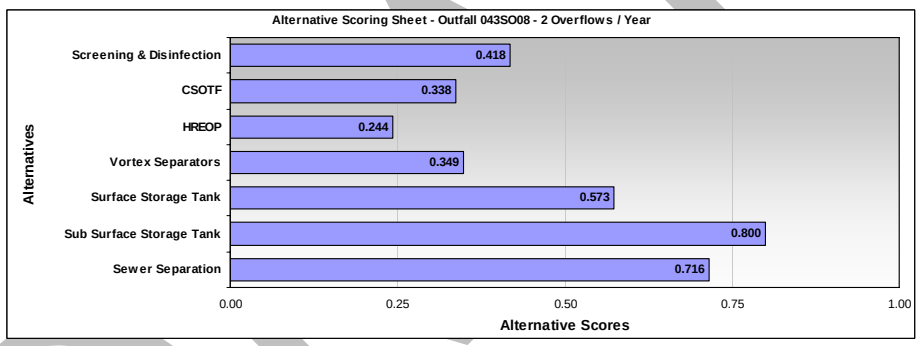
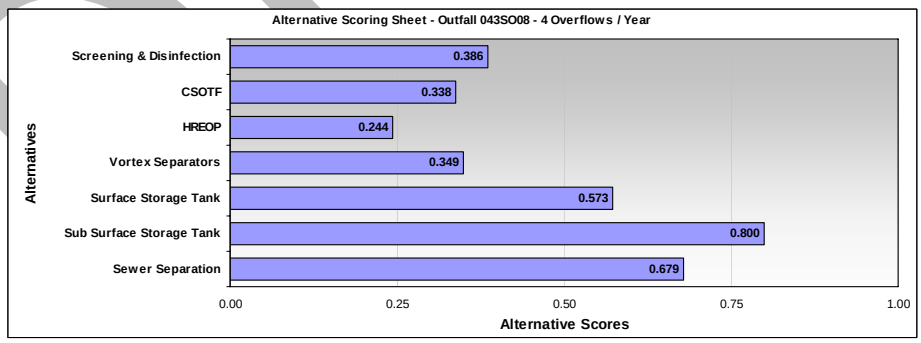
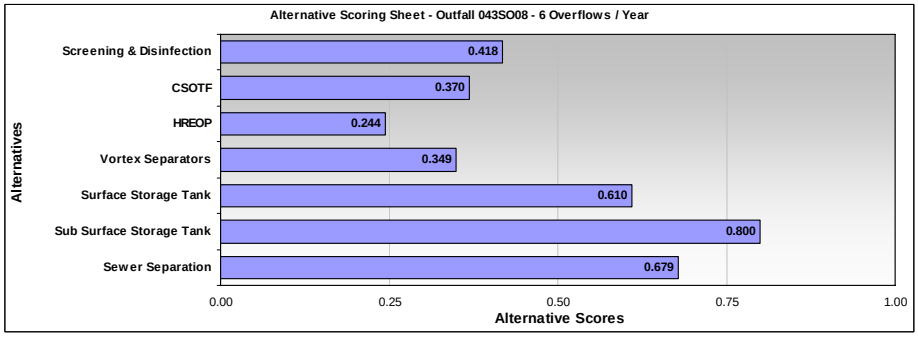
# Attachment 3 – Alternative Scoring Sheet

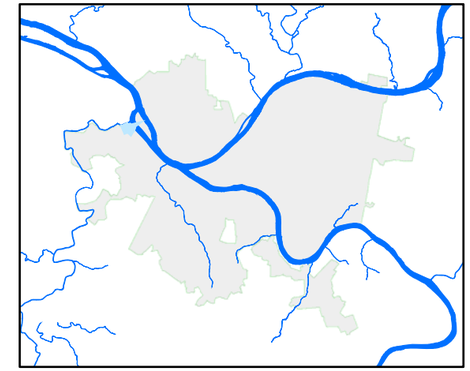




Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 200 400 Feet

# Attachment 4
# O-8
# Facilities Boundary Map
# Glen Mawr Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0198.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 3 | 3 | 4 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 3 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.670** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.743** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.727** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.764** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.764** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.610** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.381** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

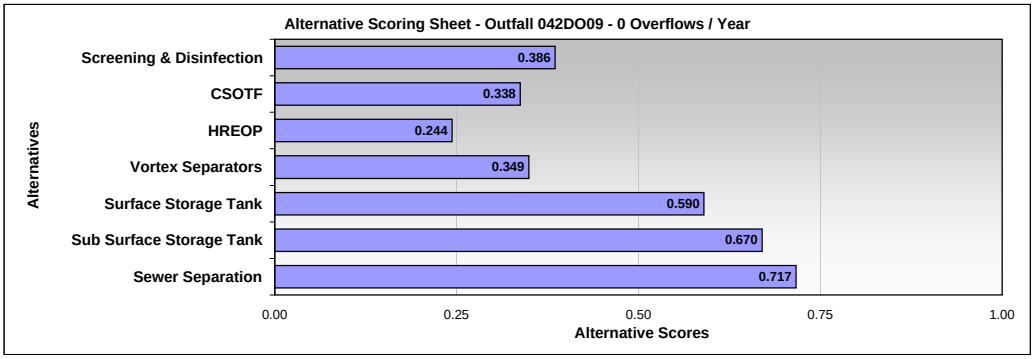
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

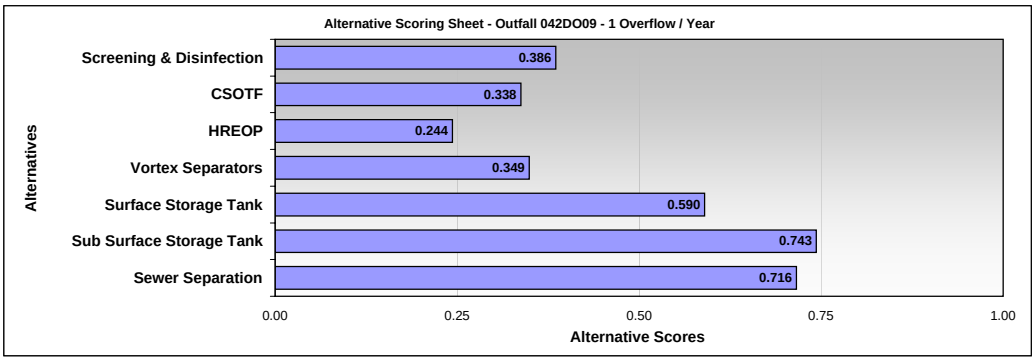
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

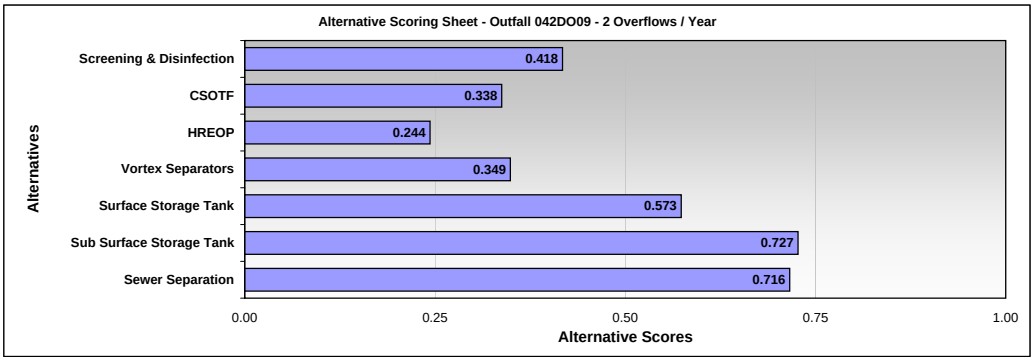
Total Score

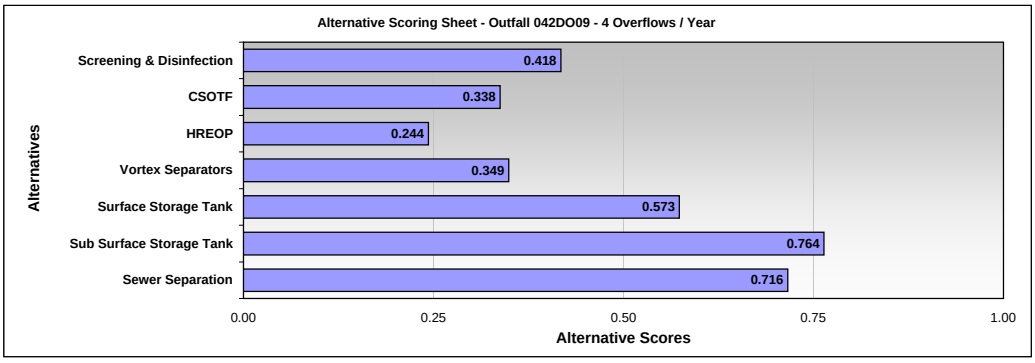
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

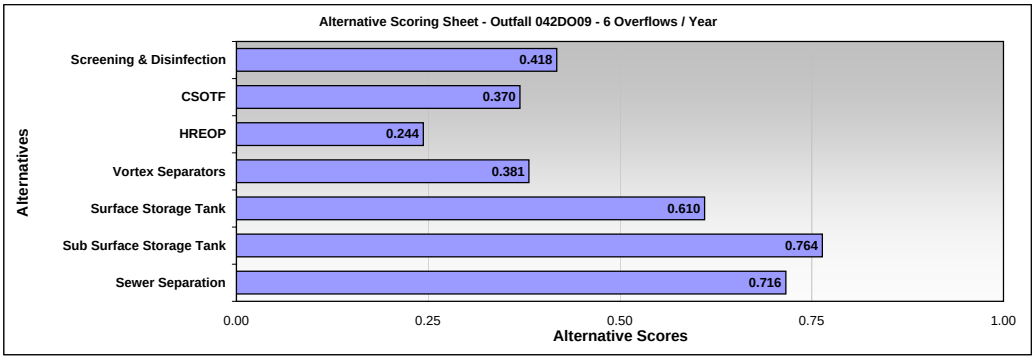
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |


Alternative Scoring Sheet - Outfall 042DO09 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.590
0.670
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 042DO09 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.590
0.743
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 042DO09 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.727
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 042DO09 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.764
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 042DO09 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.370
0.244
0.381
0.610
0.764
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 15 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 6,534 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **13,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,302,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.12 | 17,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.15 | 20,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 46 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 31 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.16 | 21,390 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **97,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 7.18 | 11.10 | = Peak Rate |
| Force Main Diameter (In) | | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,500,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.10 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 30,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 150 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 7.18 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,533,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.12 | 17,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.15 | 20,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 46 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 31 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.16 | 21,390 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,295,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.12 | 0.19 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 2 | | Input by Engineer |
| Force Main Velocity (FPS) | | 8.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **390,000** | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.10 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 30,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **126,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.18 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,713,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.18 | | 11.10 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,007,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.89 | | 12.21 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,586,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.10 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 7.89 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 45 | | 21 | |
| Passes / Detention (Min) | | 3 | | **15.47** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **503,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 7,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,366,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 0 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.18 | 11.10 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,200 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 50 | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 25 | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.11 | 15,000 | |
| **Construction Cost (CSOTF)** | **$** | **16,386,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 7.18 | 11.10 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,500,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.10 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **102,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 7.18 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 7.18 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | 20 | |
| Passes / Detention (Min) | | 3 | 15.49 | Ref: Tech Param-15 min minimum |
| | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **488,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 8,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **20,365,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.18 | | 11.10 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 90 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 14 | | **OK** | Input by Engineer |
| Width (Ft) | | 7 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,326,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.89 | | 12.21 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 19 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,586,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.10 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 7.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 7.89 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 45 | | 21 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.47** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 503,000 | $ | 367,000 | |
| **Construction Cost (Disinfection)** | **$** | **870,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,721,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 16,530 | CF |
| | 0.12 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 11.10 | CFS |
| | 7.18 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 7.18 | | 11.10 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **745,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 7.18 | | 11.10 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 18 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,500,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.10 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 110 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **16,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 7.18 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 43 | | 20 | |
| Passes / Detention (Min) | | 3 | | **15.49** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 488,000 | $ | 350,000 | |
| **Construction Cost (Disinfection)** | **$** | **838,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,273,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 15 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 6,534 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **13,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **2,302,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.08 | | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.10 | | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 37 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 25 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **62,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 5.71 | | 8.83 | = Peak Rate |
| Force Main Diameter (In) | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,305,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 8.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 20,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 100 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **15,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 5.71 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **676,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,225,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.08 | | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.10 | | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 37 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 25 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,169,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.08 | | 0.13 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **355,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 8.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 20,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **92,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 5.71 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **676,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,447,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.71 | | 8.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.28 | | 9.71 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 17 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,383,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 8.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.71 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **676,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 6.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 40 | | 19 | |
| Passes | | 3 | | **15.65** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **470,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 6,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,928,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.71 | 8.83 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,000 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 46 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 23 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.09 | 12,696 | |
| **Construction Cost (CSOTF)** | **$** | **16,388,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.71 | 8.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,305,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 8.83 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 19,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 950 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **88,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.71 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **676,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.71 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | 18 | |
| Passes | | 3 | **15.50** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **458,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 20,056,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.71 | | 8.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 70 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 13 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,095,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.28 | | 9.71 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 17 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,383,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 8.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 5.71 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **676,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 6.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 40 | | 19 | Input by Engineer |
| Passes | | 3 | | **15.65** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 470,000 | $ | 328,000 | |
| **Construction Cost (Disinfection)** | **$** | **798,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,142,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,049 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 8.83 | CFS |
| | 5.71 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 5.71 | | 8.83 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **676,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 5.71 | | 8.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,305,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 8.83 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 90 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **14,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 5.71 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | | 18 | |
| Passes | | 3 | | **15.50** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 458,000 | $ | 311,000 | |
| **Construction Cost (Disinfection)** | **$** | **769,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,937,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 15 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 6,534 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **13,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **2,302,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.08 | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 37 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 25 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **61,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 4.16 | 6.43 | = Peak Rate |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,074,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.43 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 20,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 100 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.16 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,920,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.08 | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 37 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 25 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,163,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.08 | 0.12 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 2 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **353,000** | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.43 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 20,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,000 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **92,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.16 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,368,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.16 | | 6.43 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.57 | | 7.07 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,139,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.43 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.16 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.57 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 34 | | 17 | |
| Passes | | 3 | | **16.34** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **434,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,572,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.16 | 6.43 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 38 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 19 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 8,664 | |
| **Construction Cost (CSOTF)** | **$** | **16,392,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.16 | 6.43 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,074,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.43 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 13,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.16 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.16 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | 16 | |
| Passes | | 3 | **16.42** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **425,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,700,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.16 | | 6.43 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,851,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.57 | | 7.07 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,139,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.43 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.16 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.57 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 34 | | 17 | Input by Engineer |
| Passes | | 3 | | **16.34** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 434,000 | $ | 286,000 | |
| **Construction Cost (Disinfection)** | **$** | **720,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **5,504,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 10,799 | CF |
| | 0.08 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 6.43 | CFS |
| | 4.16 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.16 | | 6.43 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **605,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.16 | | 6.43 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,074,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.43 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 70 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **11,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.16 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes | | 3 | | **16.42** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 425,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **700,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,561,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 15 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 6,534 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **13,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,302,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **39,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 3.86 | | 5.97 | = Peak Rate |
| Force Main Diameter (In) | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,027,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.97 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 3.86 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **591,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,832,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,082,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **331,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.97 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.86 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **591,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,220,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.86 | | 5.97 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.25 | | 6.57 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,088,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.97 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.86 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **591,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.25 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes | | 3 | | **16.07** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **427,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,499,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.86 | 5.97 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 38 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 19 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 8,664 | |
| **Construction Cost (CSOTF)** | **$** | **16,392,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.86 | 5.97 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,027,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 5.97 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 13,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.86 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **591,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.86 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | 15 | |
| Passes | | 3 | **16.07** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **419,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,633,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.86 | | 5.97 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,805,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.25 | | 6.57 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,088,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.97 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.86 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **591,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.25 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | Input by Engineer |
| Passes | | 3 | | **16.07** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 427,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **702,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,374,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 7,270 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 5.97 | CFS |
| | 3.86 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.86 | | 5.97 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **591,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.86 | | 5.97 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,027,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.97 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 60 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.86 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | | 15 | |
| Passes | | 3 | | **16.07** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 419,000 | $ | 265,000 | |
| **Construction Cost (Disinfection)** | **$** | **684,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,483,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 15 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **2,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 6,534 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **13,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **2,302,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **36,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.01 | | 3.11 | = Peak Rate |
| Force Main Diameter (In) | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,711,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.11 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **505,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,423,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,068,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **327,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.11 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **505,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,116,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 6 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.01 | 3.11 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.21 | 3.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,747,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.11 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.01 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **505,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.21 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | 12 | |
| Passes | | 3 | **16.83** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **384,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,021,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.01 | 3.11 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.01 | 3.11 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,711,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.11 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.01 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **505,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.01 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | 11 | |
| Passes | | 3 | **16.26** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **380,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,169,000** |

SW-D-0199.pdf

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.01 | | 3.11 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,515,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.21 | | 3.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,747,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.11 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **505,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 12 | Input by Engineer |
| Passes | | 3 | | **16.83** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 384,000 | $ | 213,000 | |
| **Construction Cost (Disinfection)** | **$** | **597,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **4,540,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 32 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 6,671 | CF |
| | 0.05 | MG |
| Total Volume | 116,524 | CF |
| | 0.87 | MG |
| Peak Rate | 3.11 | CFS |
| | 2.01 | MGD |

| Capital Costs - 042DO09 / Sewershed ACSO 042DO09 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.01 | | 3.11 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **505,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.01 | | 3.11 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,711,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.11 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.01 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | | 11 | |
| Passes | | 3 | | **16.26** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 380,000 | $ | 205,000 | |
| **Construction Cost (Disinfection)** | **$** | **585,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,974,000** | | | |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 7.18 | $70,133 | 20 | 10.910 | $765,145 |
| | Tank O&M | No. Events / Yr | 32 | $19,903 | 50 | 14.484 | $288,271 |
| | | Const Cost ($) | $97,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $8,040 | 20 | 10.910 | $87,714 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,284 |
| | | | **Total Annual O&M** | **$99,000** | | **Total PW O&M** | **$1,159,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.12 | $4,651 | 20 | 10.910 | $50,744 |
| | Tank O&M | No. Events / Yr | 32 | $22,898 | 50 | 14.484 | $331,650 |
| | | Const Cost ($) | $1,295,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 7 | $8,040 | 20 | 10.910 | $87,714 |
| | Odor Control O&M | Capacity (cfm) | 1,500 | $5,250 | 20 | 10.910 | $57,277 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,960 |
| | | | **Total Annual O&M** | **$41,000** | | **Total PW O&M** | **$531,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 7.18 | $70,133 | 20 | 10.910 | $765,145 |
| | Sed. Basin O&M | Flow Rate (mgd) | 7.18 | $807 | 50 | 14.484 | $11,693 |
| | Screening O&M | Flow Rate (mgd) | 7.18 | $8,040 | 20 | 10.910 | $87,714 |
| | Disinfection O&M | Flow Rate (mgd) | 7.18 | $53,420 | 20 | 10.910 | $582,811 |
| | Odor Control O&M | Capacity (cfm) | 1,150.00 | $4,025 | 20 | 10.910 | $43,913 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,831 |
| | | | **Total Annual O&M** | **$137,000** | | **Total PW O&M** | **$1,505,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 7.89 | $74,744 | 20 | 10.910 | $815,451 |
| | HREP O&M | Flow Rate (mgd) | 7.18 | $74,228 | 20 | 10.910 | $809,821 |
| | Screening O&M | Flow Rate (mgd) | 7.18 | $8,040 | 20 | 10.910 | $87,714 |
| | Disinfection O&M | Flow Rate (mgd) | 7.89 | $56,614 | 20 | 10.910 | $617,653 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,313 |
| | | | **Total Annual O&M** | **$214,000** | | **Total PW O&M** | **$2,355,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 7.89 | $74,744 | 20 | 10.910 | $815,451 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 7.18 | $807 | 20 | 10.910 | $8,808 |
| | Screening O&M | Flow Rate (mgd) | 7.18 | $8,040 | 20 | 10.910 | $87,714 |
| | Disinfection O&M | Flow Rate (mgd) | 7.89 | $56,614 | 20 | 10.910 | $617,653 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,647 |
| | | | **Total Annual O&M** | **$146,000** | | **Total PW O&M** | **$1,601,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 7.18 | $70,133 | 20 | 10.910 | $765,145 |
| | Screening O&M | Flow Rate (mgd) | 7.18 | $8,040 | 20 | 10.910 | $87,714 |
| | Disinfection O&M | Flow Rate (mgd) | 7.18 | $53,420 | 20 | 10.910 | $582,811 |
| | Odor Control O&M | Capacity (cfm) | 110.00 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,597 |
| | | | **Total Annual O&M** | **$132,000** | | **Total PW O&M** | **$1,453,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 5.71 | $60,168 | 20 | 10.910 | $656,427 |
| | Tank O&M | No. Events / Yr | 32 | $19,816 | 50 | 14.484 | $287,004 |
| | | Const Cost ($) | $62,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 6 | $7,914 | 20 | 10.910 | $86,346 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,284 |
| | | | **Total Annual O&M** | **$89,000** | | **Total PW O&M** | **$1,045,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.08 | $3,554 | 20 | 10.910 | $38,772 |
| | Tank O&M | No. Events / Yr | 32 | $22,583 | 50 | 14.484 | $327,087 |
| | | Const Cost ($) | $1,169,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 6 | $7,914 | 20 | 10.910 | $86,346 |
| | Odor Control O&M | Capacity (cfm) | 1,000 | $3,500 | 20 | 10.910 | $38,185 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,537 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$494,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 5.71 | $60,168 | 20 | 10.910 | $656,427 |
| | Sed. Basin O&M | Flow Rate (mgd) | 5.71 | $642 | 50 | 14.484 | $9,296 |
| | Screening O&M | Flow Rate (mgd) | 5.71 | $7,914 | 20 | 10.910 | $86,346 |
| | Disinfection O&M | Flow Rate (mgd) | 5.71 | $46,453 | 20 | 10.910 | $506,803 |
| | Odor Control O&M | Capacity (cfm) | 950.00 | $3,325 | 20 | 10.910 | $36,276 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,728 |
| | | | **Total Annual O&M** | **$119,000** | | **Total PW O&M** | **$1,308,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 6.28 | $64,124 | 20 | 10.910 | $699,586 |
| | HREP O&M | Flow Rate (mgd) | 5.71 | $64,860 | 20 | 10.910 | $707,623 |
| | Screening O&M | Flow Rate (mgd) | 5.71 | $7,914 | 20 | 10.910 | $86,346 |
| | Disinfection O&M | Flow Rate (mgd) | 6.28 | $49,230 | 20 | 10.910 | $537,100 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,579 |
| | | | **Total Annual O&M** | **$187,000** | | **Total PW O&M** | **$2,053,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 6.28 | $64,124 | 20 | 10.910 | $699,586 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 5.71 | $642 | 20 | 10.910 | $7,003 |
| | Screening O&M | Flow Rate (mgd) | 5.71 | $7,914 | 20 | 10.910 | $86,346 |
| | Disinfection O&M | Flow Rate (mgd) | 6.28 | $49,230 | 20 | 10.910 | $537,100 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,840 |
| | | | **Total Annual O&M** | **$122,000** | | **Total PW O&M** | **$1,343,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 5.71 | $60,168 | 20 | 10.910 | $656,427 |
| | Screening O&M | Flow Rate (mgd) | 5.71 | $7,914 | 20 | 10.910 | $86,346 |
| | Disinfection O&M | Flow Rate (mgd) | 5.71 | $46,453 | 20 | 10.910 | $506,803 |
| | Odor Control O&M | Capacity (cfm) | 90.00 | $315 | 20 | 10.910 | $3,437 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,527 |
| | | | **Total Annual O&M** | **$115,000** | | **Total PW O&M** | **$1,266,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.16 | $48,683 | 20 | 10.910 | $531,132 |
| | Tank O&M | No. Events / Yr | 32 | $19,813 | 50 | 14.484 | $286,968 |
| | | Const Cost ($) | $61,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,783 | 20 | 10.910 | $84,913 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,148 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$917,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.08 | $3,500 | 20 | 10.910 | $38,183 |
| | Tank O&M | No. Events / Yr | 32 | $22,568 | 50 | 14.484 | $326,870 |
| | | Const Cost ($) | $1,163,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,783 | 20 | 10.910 | $84,913 |
| | Odor Control O&M | Capacity (cfm) | 1,000 | $3,500 | 20 | 10.910 | $38,185 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,336 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$491,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.16 | $48,683 | 20 | 10.910 | $531,132 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.16 | $467 | 50 | 14.484 | $6,771 |
| | Screening O&M | Flow Rate (mgd) | 4.16 | $7,783 | 20 | 10.910 | $84,913 |
| | Disinfection O&M | Flow Rate (mgd) | 4.16 | $38,295 | 20 | 10.910 | $417,796 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,440 |
| | | | **Total Annual O&M** | **$98,000** | | **Total PW O&M** | **$1,077,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.57 | $51,884 | 20 | 10.910 | $566,053 |
| | HREP O&M | Flow Rate (mgd) | 4.16 | $53,828 | 20 | 10.910 | $587,263 |
| | Screening O&M | Flow Rate (mgd) | 4.16 | $7,783 | 20 | 10.910 | $84,913 |
| | Disinfection O&M | Flow Rate (mgd) | 4.57 | $40,584 | 20 | 10.910 | $442,773 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,629 |
| | | | **Total Annual O&M** | **$155,000** | | **Total PW O&M** | **$1,701,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.57 | $51,884 | 20 | 10.910 | $566,053 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.16 | $467 | 20 | 10.910 | $5,100 |
| | Screening O&M | Flow Rate (mgd) | 4.16 | $7,783 | 20 | 10.910 | $84,913 |
| | Disinfection O&M | Flow Rate (mgd) | 4.57 | $40,584 | 20 | 10.910 | $442,773 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,553 |
| | | | **Total Annual O&M** | **$101,000** | | **Total PW O&M** | **$1,110,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.16 | $48,683 | 20 | 10.910 | $531,132 |
| | Screening O&M | Flow Rate (mgd) | 4.16 | $7,783 | 20 | 10.910 | $84,913 |
| | Disinfection O&M | Flow Rate (mgd) | 4.16 | $38,295 | 20 | 10.910 | $417,796 |
| | Odor Control O&M | Capacity (cfm) | 70.00 | $245 | 20 | 10.910 | $2,673 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,293 |
| | | | **Total Annual O&M** | **$96,000** | | **Total PW O&M** | **$1,048,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.86 | $46,341 | 20 | 10.910 | $505,579 |
| | Tank O&M | No. Events / Yr | 32 | $19,758 | 50 | 14.484 | $286,171 |
| | | Const Cost ($) | $39,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,758 | 20 | 10.910 | $84,641 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,905 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$889,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,687 | 20 | 10.910 | $29,313 |
| | Tank O&M | No. Events / Yr | 32 | $22,366 | 50 | 14.484 | $323,937 |
| | | Const Cost ($) | $1,082,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,758 | 20 | 10.910 | $84,641 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,124 |
| | | | **Total Annual O&M** | **$35,000** | | **Total PW O&M** | **$464,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.86 | $46,341 | 20 | 10.910 | $505,579 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.86 | $434 | 50 | 14.484 | $6,289 |
| | Screening O&M | Flow Rate (mgd) | 3.86 | $7,758 | 20 | 10.910 | $84,641 |
| | Disinfection O&M | Flow Rate (mgd) | 3.86 | $36,611 | 20 | 10.910 | $399,428 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,194 |
| | | | **Total Annual O&M** | **$94,000** | | **Total PW O&M** | **$1,032,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.25 | $49,388 | 20 | 10.910 | $538,819 |
| | HREP O&M | Flow Rate (mgd) | 3.86 | $51,542 | 20 | 10.910 | $562,319 |
| | Screening O&M | Flow Rate (mgd) | 3.86 | $7,758 | 20 | 10.910 | $84,641 |
| | Disinfection O&M | Flow Rate (mgd) | 4.25 | $38,800 | 20 | 10.910 | $423,306 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,238 |
| | | | **Total Annual O&M** | **$148,000** | | **Total PW O&M** | **$1,629,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.25 | $49,388 | 20 | 10.910 | $538,819 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.86 | $434 | 20 | 10.910 | $4,737 |
| | Screening O&M | Flow Rate (mgd) | 3.86 | $7,758 | 20 | 10.910 | $84,641 |
| | Disinfection O&M | Flow Rate (mgd) | 4.25 | $38,800 | 20 | 10.910 | $423,306 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,288 |
| | | | **Total Annual O&M** | **$97,000** | | **Total PW O&M** | **$1,063,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.86 | $46,341 | 20 | 10.910 | $505,579 |
| | Screening O&M | Flow Rate (mgd) | 3.86 | $7,758 | 20 | 10.910 | $84,641 |
| | Disinfection O&M | Flow Rate (mgd) | 3.86 | $36,611 | 20 | 10.910 | $399,428 |
| | Odor Control O&M | Capacity (cfm) | 60.00 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,045 |
| | | | **Total Annual O&M** | **$91,000** | | **Total PW O&M** | **$1,003,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.01 | $29,976 | 20 | 10.910 | $327,041 |
| | Tank O&M | No. Events / Yr | 32 | $19,751 | 50 | 14.484 | $286,063 |
| | | Const Cost ($) | $36,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,603 | 20 | 10.910 | $82,948 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,382 |
| | | | **Total Annual O&M** | **$58,000** | | **Total PW O&M** | **$707,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,537 | 20 | 10.910 | $27,677 |
| | Tank O&M | No. Events / Yr | 32 | $22,331 | 50 | 14.484 | $323,430 |
| | | Const Cost ($) | $1,068,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,603 | 20 | 10.910 | $82,948 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,874 |
| | | | **Total Annual O&M** | **$35,000** | | **Total PW O&M** | **$460,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.01 | $29,976 | 20 | 10.910 | $327,041 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.01 | $226 | 50 | 14.484 | $3,277 |
| | Screening O&M | Flow Rate (mgd) | 2.01 | $7,603 | 20 | 10.910 | $82,948 |
| | Disinfection O&M | Flow Rate (mgd) | 2.01 | $24,610 | 20 | 10.910 | $268,491 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,510 |
| | | | **Total Annual O&M** | **$64,000** | | **Total PW O&M** | **$707,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.21 | $31,947 | 20 | 10.910 | $348,543 |
| | HREP O&M | Flow Rate (mgd) | 2.01 | $35,126 | 20 | 10.910 | $383,221 |
| | Screening O&M | Flow Rate (mgd) | 2.01 | $7,603 | 20 | 10.910 | $82,948 |
| | Disinfection O&M | Flow Rate (mgd) | 2.21 | $26,081 | 20 | 10.910 | $284,542 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,691 |
| | | | **Total Annual O&M** | **$101,000** | | **Total PW O&M** | **$1,115,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.21 | $31,947 | 20 | 10.910 | $348,543 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.01 | $226 | 20 | 10.910 | $2,468 |
| | Screening O&M | Flow Rate (mgd) | 2.01 | $7,603 | 20 | 10.910 | $82,948 |
| | Disinfection O&M | Flow Rate (mgd) | 2.21 | $26,081 | 20 | 10.910 | $284,542 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,546 |
| | | | **Total Annual O&M** | **$66,000** | | **Total PW O&M** | **$728,000** |

| ACSO 042DO09 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.01 | $29,976 | 20 | 10.910 | $327,041 |
| | Screening O&M | Flow Rate (mgd) | 2.01 | $7,603 | 20 | 10.910 | $82,948 |
| | Disinfection O&M | Flow Rate (mgd) | 2.01 | $24,610 | 20 | 10.910 | $268,491 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,404 |
| | | | **Total Annual O&M** | **$63,000** | | **Total PW O&M** | **$689,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.3 | $2,302,000 | $0 |
| 1 | $2.3 | $2,302,000 | $0 |
| 2 | $2.3 | $2,302,000 | $0 |
| 4 | $2.3 | $2,302,000 | $0 |
| 6 | $2.3 | $2,302,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.2 | $2,713,000 | $531,000 |
| 1 | $2.9 | $2,447,000 | $494,000 |
| 2 | $2.9 | $2,368,000 | $491,000 |
| 4 | $2.7 | $2,220,000 | $464,000 |
| 6 | $2.6 | $2,116,000 | $460,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.7 | $3,533,000 | $1,159,000 |
| 1 | $4.3 | $3,225,000 | $1,045,000 |
| 2 | $3.8 | $2,920,000 | $917,000 |
| 4 | $3.7 | $2,832,000 | $889,000 |
| 6 | $3.1 | $2,423,000 | $707,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.0 | $5,366,000 | $1,601,000 |
| 1 | $5.3 | $3,928,000 | $1,343,000 |
| 2 | $4.7 | $3,572,000 | $1,110,000 |
| 4 | $4.6 | $3,499,000 | $1,063,000 |
| 6 | $3.7 | $3,021,000 | $728,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $9.1 | $6,721,000 | $2,355,000 |
| 1 | $8.2 | $6,142,000 | $2,053,000 |
| 2 | $7.2 | $5,504,000 | $1,701,000 |
| 4 | $7.0 | $5,374,000 | $1,629,000 |
| 6 | $5.7 | $4,540,000 | $1,115,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $21.9 | $20,365,000 | $1,505,000 |
| 1 | $21.4 | $20,056,000 | $1,308,000 |
| 2 | $20.8 | $19,700,000 | $1,077,000 |
| 4 | $20.7 | $19,633,000 | $1,032,000 |
| 6 | $19.9 | $19,169,000 | $707,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.7 | $4,273,000 | $1,453,000 |
| 1 | $5.2 | $3,937,000 | $1,266,000 |
| 2 | $4.6 | $3,561,000 | $1,048,000 |
| 4 | $4.5 | $3,483,000 | $1,003,000 |
| 6 | $3.7 | $2,974,000 | $689,000 |

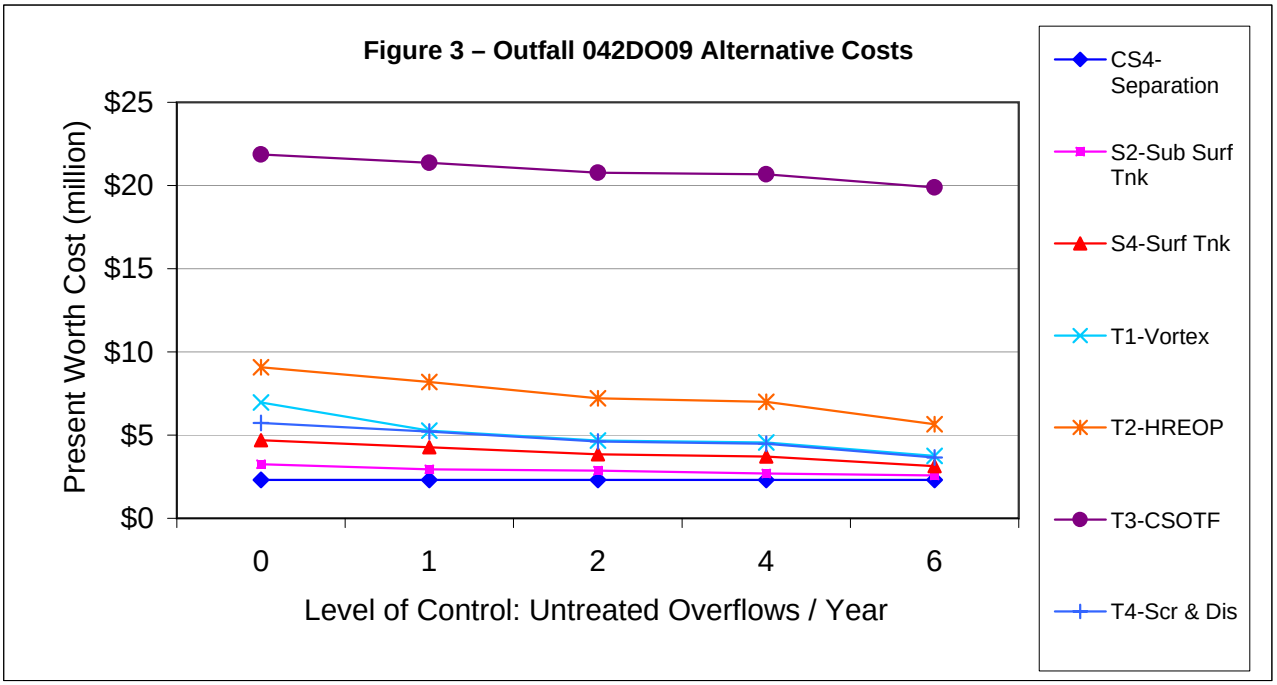


Figure 3 – Outfall 042DO09 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 042DO09 |
| **Location Name** | Frustum Street |
| **Model ID** | ADC 042D009.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 042DO09 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 32 |
| Peak Volume: | 16,530 $ft^3$ |
| | 0.12 MG |
| Total Volume: | 116,524 $ft^3$ |
| | 0.87 MG |
| Peak Rate: | 11.10 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 7/12/2005 19:35 | 64 | 7/12/2005 20:00 | 16529.51 | 123.649 | 0 | 11.10 | 0 |
| 8/20/2005 18:15 | 75 | 8/20/2005 18:30 | 11049.19 | 82.653 | 1 | 6.19 | 3 |
| 1/11/2005 9:10 | 544 | 1/11/2005 9:45 | 10799.25 | 80.784 | 2 | 1.06 | 19 |
| 7/5/2005 16:15 | 95 | 7/5/2005 16:30 | 9744.32 | 72.892 | 3 | 8.83 | 1 |
| 11/29/2005 8:20 | 246 | 11/29/2005 11:15 | 7270.24 | 54.385 | 4 | 1.53 | 14 |
| 5/13/2005 23:10 | 104 | 5/13/2005 23:45 | 6743.63 | 50.446 | 5 | 2.16 | 9 |
| 11/14/2005 22:45 | 339 | 11/15/2005 3:45 | 6671.21 | 49.904 | 6 | 1.68 | 11 |
| 6/11/2005 17:45 | 34 | 6/11/2005 18:00 | 5069.14 | 37.920 | 7 | 5.97 | 4 |
| 5/14/2005 16:05 | 35 | 5/14/2005 16:15 | 4216.34 | 31.540 | 8 | 6.43 | 2 |
| 1/12/2005 1:05 | 154 | 1/12/2005 1:30 | 3686.66 | 27.578 | 9 | 1.54 | 12 |
| 10/25/2005 2:15 | 145 | 10/25/2005 4:00 | 3238.30 | 24.224 | 10 | 0.70 | 23 |
| 1/3/2005 13:00 | 456 | 1/3/2005 14:00 | 3202.77 | 23.958 | 11 | 0.46 | 27 |
| 3/28/2005 9:55 | 609 | 3/28/2005 10:15 | 2822.15 | 21.111 | 12 | 0.50 | 26 |
| 4/2/2005 6:20 | 232 | 4/2/2005 6:30 | 2639.90 | 19.748 | 13 | 0.72 | 22 |
| 1/8/2005 4:55 | 68 | 1/8/2005 5:15 | 2216.27 | 16.579 | 14 | 1.12 | 18 |
| 5/23/2005 16:20 | 15 | 5/23/2005 16:30 | 2048.85 | 15.326 | 15 | 3.52 | 5 |
| 1/5/2005 14:15 | 799 | 1/5/2005 14:45 | 1939.01 | 14.505 | 16 | 0.54 | 25 |
| 8/29/2005 12:50 | 33 | 8/29/2005 13:00 | 1872.16 | 14.005 | 17 | 1.92 | 10 |
| 7/26/2005 19:45 | 20 | 7/26/2005 20:00 | 1859.56 | 13.910 | 18 | 2.36 | 8 |
| 11/9/2005 19:20 | 15 | 11/9/2005 19:30 | 1793.67 | 13.418 | 19 | 3.11 | 6 |
| 7/15/2005 18:00 | 49 | 7/15/2005 18:15 | 1551.84 | 11.609 | 20 | 1.24 | 16 |
| 5/11/2005 23:25 | 47 | 5/11/2005 23:45 | 1403.54 | 10.499 | 21 | 0.84 | 20 |
| 3/24/2005 9:35 | 15 | 3/24/2005 9:45 | 1272.17 | 9.516 | 22 | 2.84 | 7 |
| 4/23/2005 3:35 | 79 | 4/23/2005 3:45 | 1214.15 | 9.082 | 23 | 1.37 | 15 |
| 12/15/2005 13:45 | 44 | 12/15/2005 14:00 | 1170.74 | 8.758 | 24 | 1.24 | 17 |
| 2/14/2005 8:29 | 680 | 2/14/2005 14:55 | 919.68 | 6.880 | 25 | 0.18 | 31 |
| 9/29/2005 5:35 | 15 | 9/29/2005 5:45 | 913.30 | 6.832 | 26 | 1.54 | 13 |
| 2/9/2005 16:20 | 34 | 2/9/2005 16:45 | 834.78 | 6.245 | 27 | 0.73 | 21 |
| 2/20/2005 19:55 | 41 | 2/20/2005 20:00 | 679.68 | 5.084 | 28 | 0.69 | 24 |
| 1/14/2005 0:58 | 81 | 1/14/2005 2:00 | 667.60 | 4.994 | 29 | 0.23 | 30 |
| 10/7/2005 10:42 | 35 | 10/7/2005 11:00 | 332.33 | 2.486 | 30 | 0.29 | 29 |
| 3/23/2005 12:36 | 18 | 3/23/2005 12:45 | 152.15 | 1.138 | 31 | 0.29 | 28 |

## Region 1

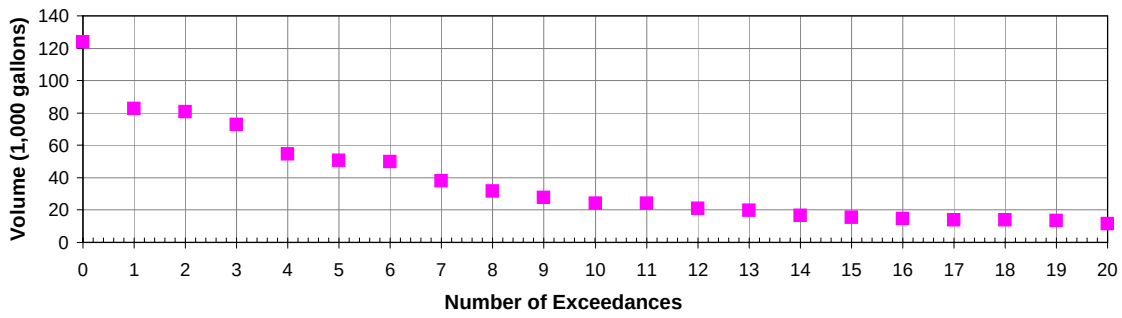
### PWSA CSO DISCHARGES
### for "Typical Year - 2005"
### Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 042DO09 |
| **Location Name** | Frustum Street |
| **Model ID** | ADC 042D009.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 042DO09 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

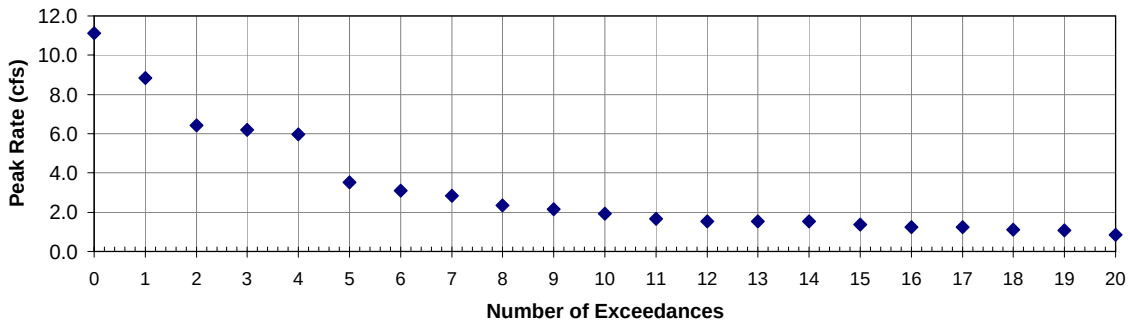
**Results Summary**

| | |
|---|---|
| Number of Events: | 32 |
| Peak Volume: | 16,530 $ft^3$ |
| | 0.12 MG |
| Total Volume: | 116,524 $ft^3$ |
| | 0.87 MG |
| Peak Rate: | 11.10 cfs |

### Figure 1 - Outfall 042D0O9 CSO Volume




### Figure 2 - Outfall 042D0O9 CSO Peak Flow Rate



## D.25.2 O-9 – GLEN MAWR SEWERSHED – NPDES# 042DO09

### Description of Outfall

Outfall 042DO09 conveys overflows from the ALCOSAN diversion chamber O-9 to the Ohio River. The outfall is located along east of West Carson Street south of Corks Run in the City of Pittsburgh. The outfall is located approximately 200 feet east of West Carson Street. The tributary sewershed is 15 acres of residential, business and commercial users. The outfall is located within the Glen Mawr sewershed which is comprised of approximately 540 manholes and 135,718 linear feet (25.7 miles) of mostly combined sewer up to 120 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 042DO09 typically experiences 32 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 042DO09 is approximately 0.12 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 042DO09 is approximately 11.1 CFS. *Figure 1 – Outfall 042DO09 CSO Volume* and *Figure 2 – Outfall 042DO09 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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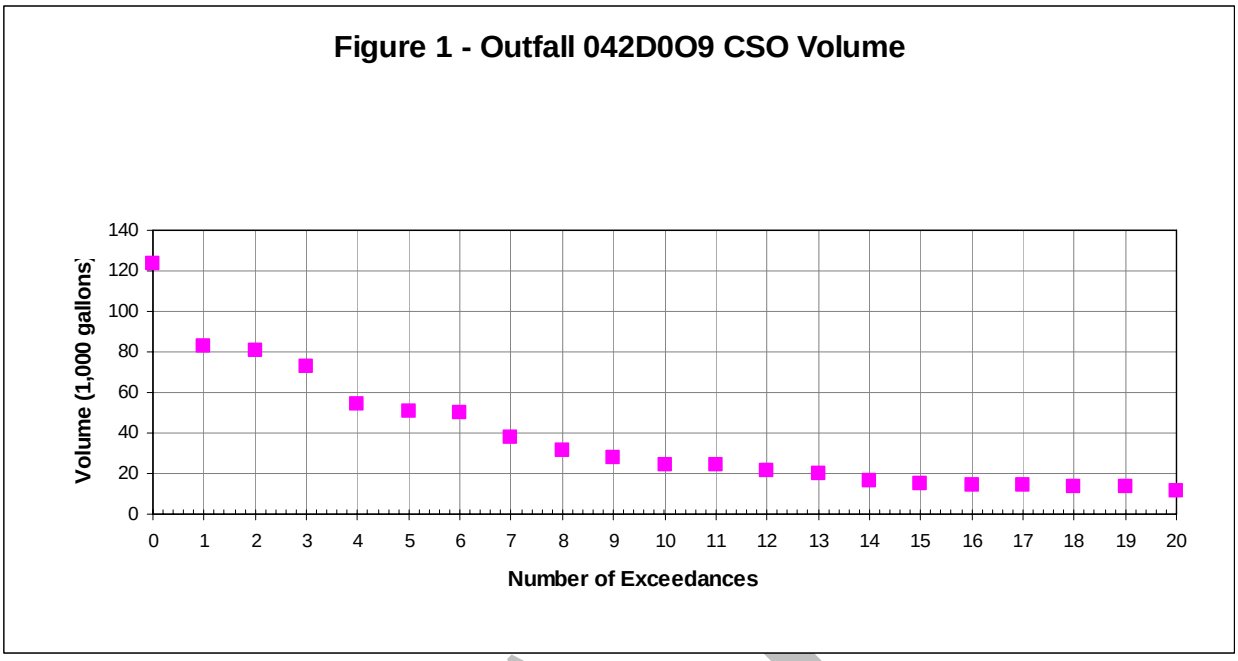
Figure 1 - Outfall 042D0O9 CSO Volume
Volume (1,000 gallons)
140
120
100
80
60
40
20
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

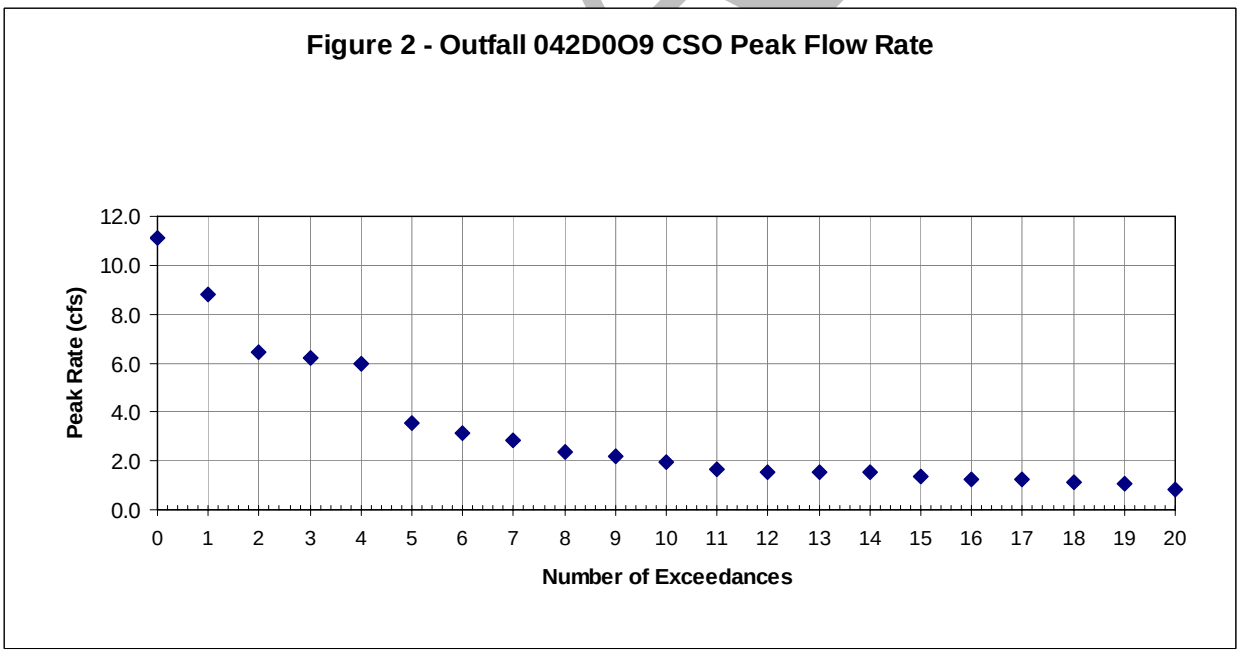
Figure 2 - Outfall 042D0O9 CSO Peak Flow Rate
Peak Rate (cfs)
12.0
10.0
8.0
6.0
4.0
2.0
0.0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Number of Exceedances

There appears to be a limited amount of available space for potential storage or treatment facilities in the area between the existing railroad tracks and the Ohio River. The site is generally bounded by the Ohio River to the east, railroad tracks and Carson Street to the west and undeveloped property to the north and south (bank of the Ohio River). Within the boundaries of this critical infrastructure, there appears to be potential space for a storage or treatment facility.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 042DO09. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-042DO09: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-042DO09: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

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S4-042DO09: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-042DO09: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-042DO09: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-042DO09: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

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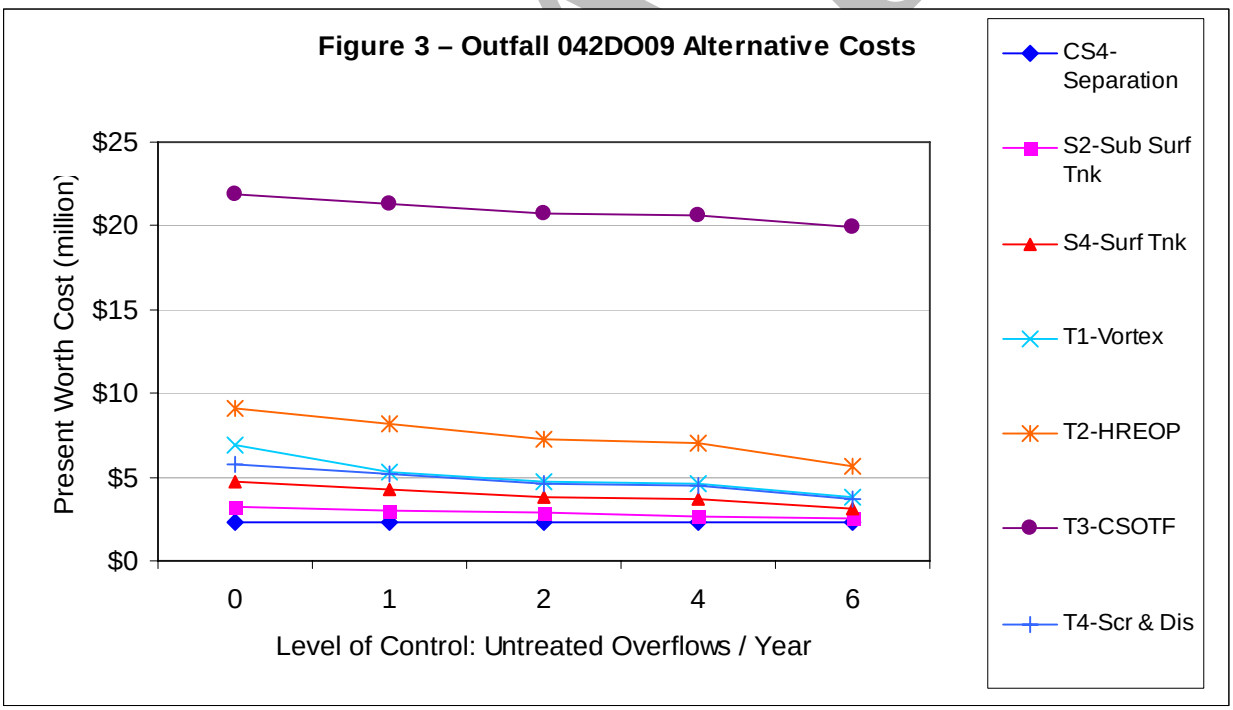
T4-042DO09: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 114JO25 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control level 0, it is recommended that Alternative CS4-042DO09: Sewer Separation be carried forward and re-evaluated with the results of the regional system-wide alternatives analysis. For control levels 1 through 6, it is recommended that Alternative S2-042DO09: Sub-Surface Storage be carried forward.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

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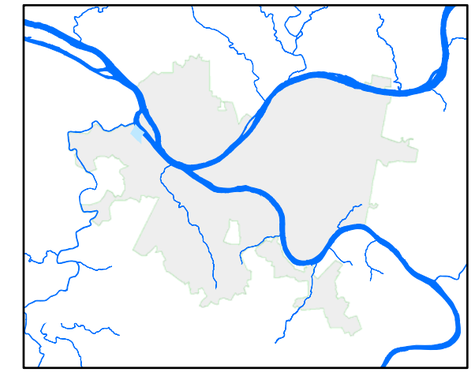

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

200 0 200 Feet

# Attachment 1
# O-9
# Tributary Area Map
# Glen Mawr Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

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# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 15 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening in conjunction with storage and treatment alternatives will be evaluated. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection in conjunction with treatment alternatives will be evaluated. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation will be evaluated and will include screening and disinfection. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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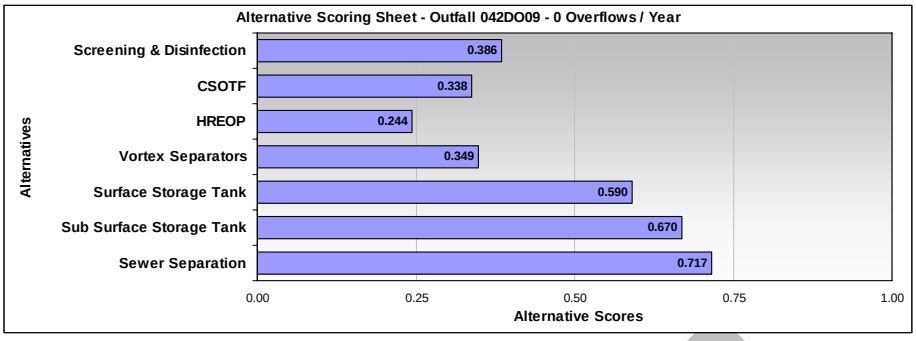
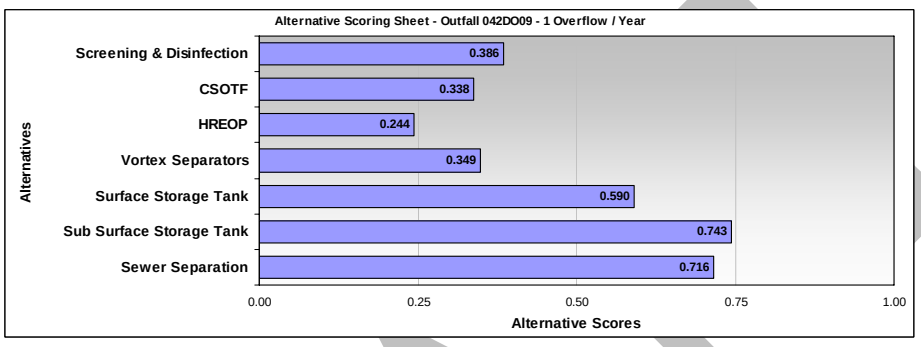
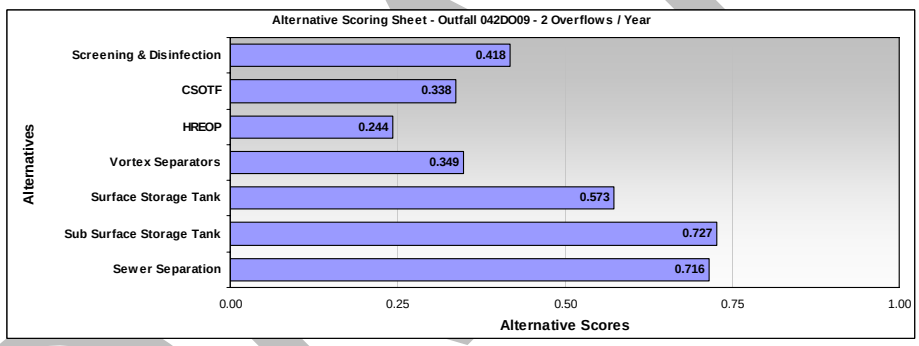
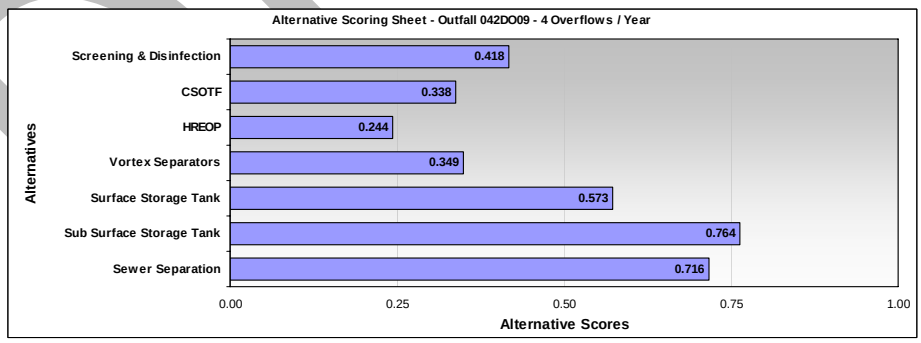
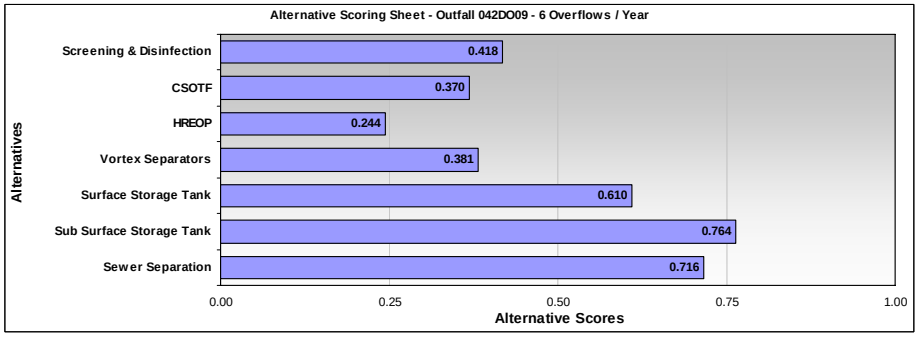
# Attachment 3 – Alternative Scoring Sheet





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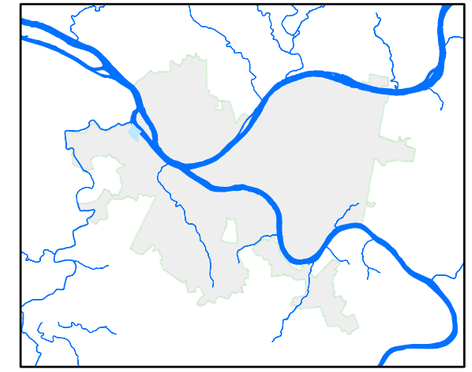


Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 200 400 Feet

# Attachment 4
# O-9
# Facilities Boundary Map
# Glen Mawr
# Sewershed

CSO Controls Alternatives

PWSA

SW-D-0200.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 4 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 2 | 2 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 3 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.670** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.670** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.653** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.653** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.621** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.590** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.541** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.541** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.509** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.381** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.381** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.381** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.413** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.402** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

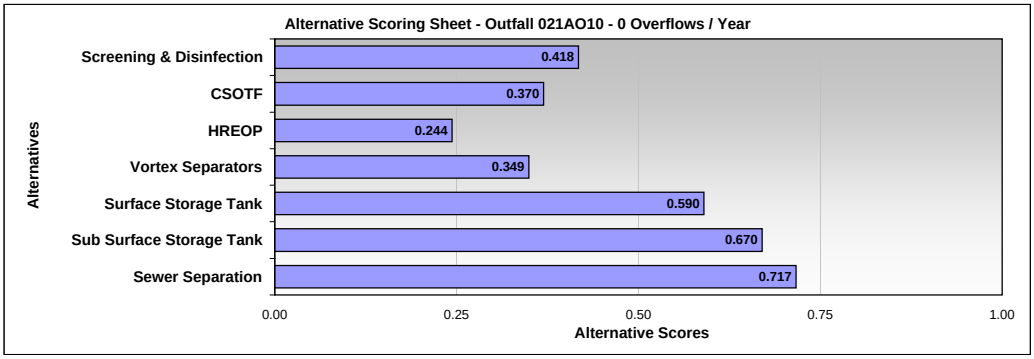
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

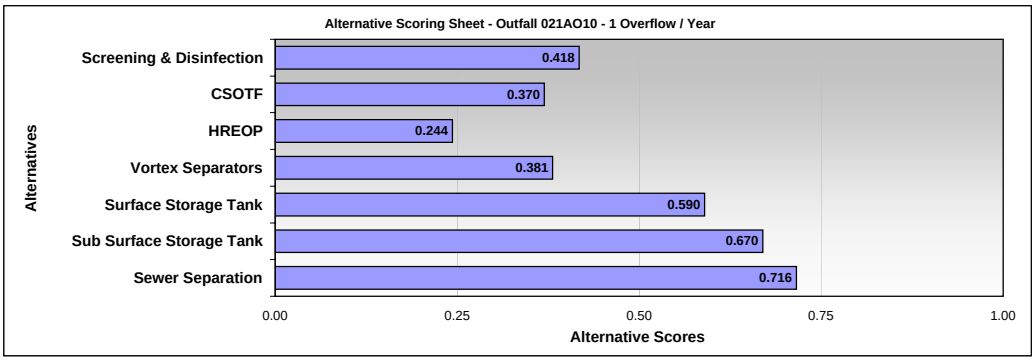
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.450** |

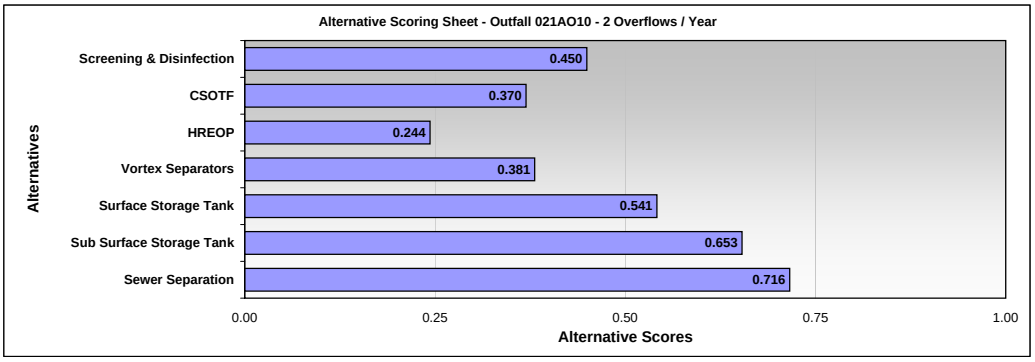
Total Score

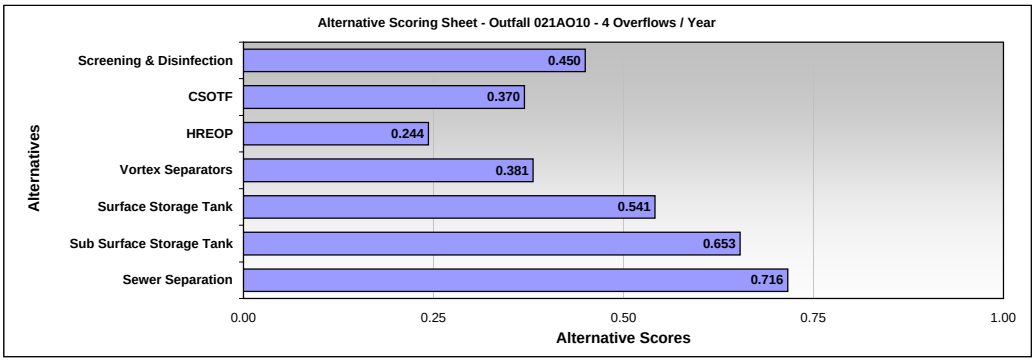
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.450** |

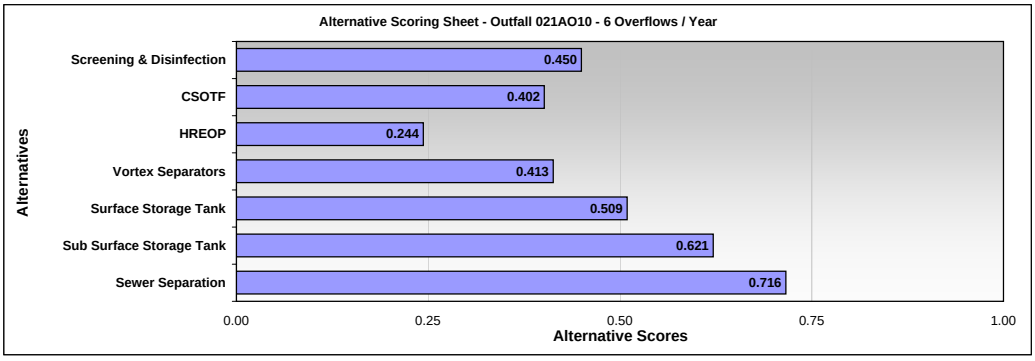
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.450** |


Alternative Scoring Sheet - Outfall 021AO10 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.370
0.244
0.349
0.590
0.670
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 021AO10 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.370
0.244
0.381
0.590
0.670
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 021AO10 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.450
0.370
0.244
0.381
0.541
0.653
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 021AO10 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.450
0.370
0.244
0.381
0.541
0.653
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 021AO10 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.450
0.402
0.244
0.413
0.509
0.621
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 7 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,050,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,049 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,095,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.06 | 8,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.07 | 9,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 31 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 21 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.07 | 9,765 | **Insufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **46,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 3.15 | 4.88 | = Peak Rate |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,911,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.88 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 14,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 70 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **11,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 3.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **558,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,689,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.06 | | 8,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.07 | | 9,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 31 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 21 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 9,765 | **Insufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,106,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.06 | | 0.10 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 337,000** | | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.88 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 14,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 700 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 69,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 558,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 40,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **2,225,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.15 | | 4.88 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **609,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.47 | | 5.37 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,963,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.88 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **558,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.47 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 14 | |
| Passes / Detention (Min) | | 3 | | **15.66** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **411,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,053,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.15 | 4.88 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.15 | 4.88 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,911,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.88 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **558,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.15 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | 14 | |
| Passes / Detention (Min) | | 3 | **16.65** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **404,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,462,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.15 | | 4.88 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,694,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.47 | | 5.37 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,963,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.88 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **558,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.47 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 14 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.66** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 411,000 | $ | 250,000 | |
| **Construction Cost (Disinfection)** | **$** | **661,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,055,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 8,334 | CF |
| | 0.06 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.88 | CFS |
| | 3.15 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.15 | | 4.88 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **558,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.15 | | 4.88 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,911,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.88 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.15 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes / Detention (Min) | | 3 | | **16.65** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 404,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **650,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,297,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 7 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,050,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,049 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **1,095,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **36,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.61 | | 4.03 | = Peak Rate |
| Force Main Diameter (In) | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,817,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.03 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,558,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,069,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **327,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.03 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,145,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | | 4.03 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.87 | | 4.44 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,862,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.03 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.87 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | |
| Passes | | 3 | | **15.83** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **398,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,182,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | 4.03 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.61 | 4.03 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,817,000** | **$ 20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.03 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.61 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.61 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | 13 | |
| Passes | | 3 | **16.77** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **393,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **19,324,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.61 | | 4.03 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,608,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.87 | | 4.44 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,862,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.03 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.61 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.87 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | Input by Engineer |
| Passes | | 3 | | **15.83** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 398,000 | $ | 232,000 | |
| **Construction Cost (Disinfection)** | **$** | **630,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **4,811,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 6,730 | CF |
| | 0.05 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 4.03 | CFS |
| | 2.61 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **1 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.61 | | 4.03 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **533,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.61 | | 4.03 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,817,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.03 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.61 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | |
| Passes | | 3 | | **16.77** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 393,000 | $ | 227,000 | |
| **Construction Cost (Disinfection)** | **$** | **620,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,145,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 7 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,050,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,049 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,095,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.04 | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.05 | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 27 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 19 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.06 | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **32,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 1.87 | 2.89 | = Peak Rate |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.5 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,685,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.89 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 11,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 60 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 1.87 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **499,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,387,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,050,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.07 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 12.6 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **322,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 2.89 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 550 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **57,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 1.87 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **499,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,082,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 2 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.87 | 2.89 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.05 | 3.18 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,719,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.89 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.87 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **499,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.05 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | 11 | |
| Passes | | 3 | **15.93** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **381,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,984,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.87 | 2.89 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.87 | 2.89 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.5 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,685,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.89 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.87 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **499,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.87 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | 11 | |
| Passes | | 3 | **16.76** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **377,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,134,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.87 | | 2.89 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,493,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.05 | | 3.18 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,719,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.89 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 1.87 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **499,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.05 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | | 11 | Input by Engineer |
| Passes | | 3 | | **15.93** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 381,000 | $ | 205,000 | |
| **Construction Cost (Disinfection)** | **$** | **586,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,473,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,917 | CF |
| | 0.04 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.89 | CFS |
| | 1.87 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 1.87 | | 2.89 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **499,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 1.87 | | 2.89 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,685,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.89 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 1.87 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | | 11 | |
| Passes | | 3 | | **16.76** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 377,000 | $ | 200,000 | |
| **Construction Cost (Disinfection)** | **$** | **577,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,934,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 7 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,050,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,049 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,095,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.03 | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.04 | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 23 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 16 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.04 | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | | 0 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **22,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 1.62 | 2.50 | = Peak Rate |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,639,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.50 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 40 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 1.62 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **487,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,316,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.03 | | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.04 | | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 23 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 16 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.04 | | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,013,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.03 | | 0.05 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 9.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **312,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 2.50 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 8,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **45,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 1.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **487,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,011,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.62 | 2.50 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.78 | 2.75 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,669,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.50 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.62 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **487,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.78 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | 10 | |
| Passes | | 3 | **15.97** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **375,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,916,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.62 | 2.50 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 300 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 25 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 13 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.03 | 3,900 | |
| **Construction Cost (CSOTF)** | **$** | **16,397,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.62 | 2.50 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,639,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.50 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 300 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **36,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.62 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **487,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.62 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 21 | 10 | |
| Passes | | 3 | **16.77** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **372,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,064,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.62 | | 2.50 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 20 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 7 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,454,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.78 | | 2.75 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 9 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,669,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.50 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 1.62 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **487,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 1.78 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | | 10 | Input by Engineer |
| Passes | | 3 | | **15.97** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 375,000 | $ | 196,000 | |
| **Construction Cost (Disinfection)** | **$** | **571,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **4,357,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 4,285 | CF |
| | 0.03 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 2.50 | CFS |
| | 1.62 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 1.62 | | 2.50 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **487,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 1.62 | | 2.50 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,639,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.50 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 1.62 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 21 | | 10 | |
| Passes | | 3 | | **16.77** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 372,000 | $ | 192,000 | |
| **Construction Cost (Disinfection)** | **$** | **564,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **2,863,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 7 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,050,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,049 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **1,095,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.02 | | 3,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 4,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 21 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 14 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.03 | | 4,410 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **13,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 1.04 | | 1.60 | = Peak Rate |
| Force Main Diameter (In) | 7 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,165,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.60 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 6,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 30 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **6,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 1.04 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **460,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,801,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.02 | | 3,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 4,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 21 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 14 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.03 | | 4,410 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **977,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.02 | | 0.03 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **302,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.60 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 6,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 300 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **36,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 1.04 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **460,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,927,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 6 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.04 | 1.60 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.14 | 1.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 7 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.6 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,253,000** | **$ 17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 1.60 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.04 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **460,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.14 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 18 | 8 | |
| Passes | | 3 | **16.33** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **362,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 1,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **2,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **2,456,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.04 | 1.60 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 200 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 21 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 11 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.02 | 2,772 | |
| **Construction Cost (CSOTF)** | **$** | **16,398,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.04 | 1.60 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 7 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,165,000** | **$ 17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 1.60 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 200 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.04 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **460,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.04 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 17 | 8 | |
| Passes | | 3 | **16.97** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **359,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 5,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **18,537,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.04 | | 1.60 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 20 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 7 | | OK | Input by Engineer |
| Width (Ft) | | 4 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,363,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 1.14 | | 1.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 7 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.6 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,253,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.60 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 1.04 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **460,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 1.14 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 18 | | 8 | Input by Engineer |
| Passes | | 3 | | 16.33 | Input by Engineer / 12' SWD Basis |
| | | | | OK Detn Time | |
| Construction Cost (Disinfection / CC Tank) | $ | 362,000 | $ | 171,000 | |
| **Construction Cost (Disinfection)** | **$** | **533,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,781,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 41 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 2,714 | CF |
| | 0.02 | MG |
| Total Volume | 61,925 | CF |
| | 0.46 | MG |
| Peak Rate | 1.60 | CFS |
| | 1.04 | MGD |

| Capital Costs - 021AO10 / Sewershed ACSO 021AO10 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 1.04 | | 1.60 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **460,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 1.04 | | 1.60 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 7 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,165,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.60 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 20 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **4,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 1.04 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 17 | | 8 | |
| Passes | | 3 | | **16.97** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 359,000 | $ | 167,000 | |
| **Construction Cost (Disinfection)** | **$** | **526,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,320,000** | | | |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.15 | $40,478 | 20 | 10.910 | $441,608 |
| | Tank O&M | No. Events / Yr | 41 | $25,305 | 50 | 14.484 | $366,513 |
| | | Const Cost ($) | $46,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,699 | 20 | 10.910 | $83,991 |
| | Odor Control O&M | Capacity (cfm) | 70 | $245 | 20 | 10.910 | $2,673 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,345 |
| | | | **Total Annual O&M** | **$74,000** | | **Total PW O&M** | **$904,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.06 | $2,944 | 20 | 10.910 | $32,114 |
| | Tank O&M | No. Events / Yr | 41 | $27,955 | 50 | 14.484 | $404,895 |
| | | Const Cost ($) | $1,106,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,699 | 20 | 10.910 | $83,991 |
| | Odor Control O&M | Capacity (cfm) | 700 | $2,450 | 20 | 10.910 | $26,729 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,080 |
| | | | **Total Annual O&M** | **$42,000** | | **Total PW O&M** | **$551,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.15 | $40,478 | 20 | 10.910 | $441,608 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.15 | $355 | 50 | 14.484 | $5,136 |
| | Screening O&M | Flow Rate (mgd) | 3.15 | $7,699 | 20 | 10.910 | $83,991 |
| | Disinfection O&M | Flow Rate (mgd) | 3.15 | $32,363 | 20 | 10.910 | $353,074 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,579 |
| | | | **Total Annual O&M** | **$83,000** | | **Total PW O&M** | **$917,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.47 | $43,139 | 20 | 10.910 | $470,642 |
| | HREP O&M | Flow Rate (mgd) | 3.15 | $45,755 | 20 | 10.910 | $499,190 |
| | Screening O&M | Flow Rate (mgd) | 3.15 | $7,699 | 20 | 10.910 | $83,991 |
| | Disinfection O&M | Flow Rate (mgd) | 3.47 | $34,297 | 20 | 10.910 | $374,181 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,277 |
| | | | **Total Annual O&M** | **$132,000** | | **Total PW O&M** | **$1,445,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.47 | $43,139 | 20 | 10.910 | $470,642 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.15 | $355 | 20 | 10.910 | $3,869 |
| | Screening O&M | Flow Rate (mgd) | 3.15 | $7,699 | 20 | 10.910 | $83,991 |
| | Disinfection O&M | Flow Rate (mgd) | 3.47 | $34,297 | 20 | 10.910 | $374,181 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,805 |
| | | | **Total Annual O&M** | **$91,000** | | **Total PW O&M** | **$1,000,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.15 | $40,478 | 20 | 10.910 | $441,608 |
| | Screening O&M | Flow Rate (mgd) | 3.15 | $7,699 | 20 | 10.910 | $83,991 |
| | Disinfection O&M | Flow Rate (mgd) | 3.15 | $32,363 | 20 | 10.910 | $353,074 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,438 |
| | | | **Total Annual O&M** | **$81,000** | | **Total PW O&M** | **$891,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,643 | 20 | 10.910 | $388,858 |
| | Tank O&M | No. Events / Yr | 41 | $25,280 | 50 | 14.484 | $366,151 |
| | | Const Cost ($) | $36,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,653 | 20 | 10.910 | $83,491 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,890 |
| | | | **Total Annual O&M** | **$69,000** | | **Total PW O&M** | **$850,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,552 | 20 | 10.910 | $27,840 |
| | Tank O&M | No. Events / Yr | 41 | $27,863 | 50 | 14.484 | $403,555 |
| | | Const Cost ($) | $1,069,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,653 | 20 | 10.910 | $83,491 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,950 |
| | | | **Total Annual O&M** | **$41,000** | | **Total PW O&M** | **$541,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,643 | 20 | 10.910 | $388,858 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.61 | $293 | 50 | 14.484 | $4,246 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,491 |
| | Disinfection O&M | Flow Rate (mgd) | 2.61 | $28,818 | 20 | 10.910 | $314,406 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,076 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$820,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.87 | $37,986 | 20 | 10.910 | $414,425 |
| | HREP O&M | Flow Rate (mgd) | 2.61 | $40,908 | 20 | 10.910 | $446,309 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,491 |
| | Disinfection O&M | Flow Rate (mgd) | 2.87 | $30,541 | 20 | 10.910 | $333,202 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,528 |
| | | | **Total Annual O&M** | **$118,000** | | **Total PW O&M** | **$1,294,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.87 | $37,986 | 20 | 10.910 | $414,425 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.61 | $293 | 20 | 10.910 | $3,198 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,491 |
| | Disinfection O&M | Flow Rate (mgd) | 2.87 | $30,541 | 20 | 10.910 | $333,202 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,129 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$844,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.61 | $35,643 | 20 | 10.910 | $388,858 |
| | Screening O&M | Flow Rate (mgd) | 2.61 | $7,653 | 20 | 10.910 | $83,491 |
| | Disinfection O&M | Flow Rate (mgd) | 2.61 | $28,818 | 20 | 10.910 | $314,406 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,951 |
| | | | **Total Annual O&M** | **$73,000** | | **Total PW O&M** | **$798,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.87 | $28,514 | 20 | 10.910 | $311,087 |
| | Tank O&M | No. Events / Yr | 41 | $25,270 | 50 | 14.484 | $366,006 |
| | | Const Cost ($) | $32,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,591 | 20 | 10.910 | $82,815 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,259 |
| | | | **Total Annual O&M** | **$62,000** | | **Total PW O&M** | **$770,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,341 | 20 | 10.910 | $25,545 |
| | Tank O&M | No. Events / Yr | 41 | $27,815 | 50 | 14.484 | $402,867 |
| | | Const Cost ($) | $1,050,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,591 | 20 | 10.910 | $82,815 |
| | Odor Control O&M | Capacity (cfm) | 550 | $1,925 | 20 | 10.910 | $21,002 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,826 |
| | | | **Total Annual O&M** | **$40,000** | | **Total PW O&M** | **$535,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 1.87 | $28,514 | 20 | 10.910 | $311,087 |
| | Sed. Basin O&M | Flow Rate (mgd) | 1.87 | $210 | 50 | 14.484 | $3,040 |
| | Screening O&M | Flow Rate (mgd) | 1.87 | $7,591 | 20 | 10.910 | $82,815 |
| | Disinfection O&M | Flow Rate (mgd) | 1.87 | $23,513 | 20 | 10.910 | $256,522 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,380 |
| | | | **Total Annual O&M** | **$62,000** | | **Total PW O&M** | **$678,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.05 | $30,389 | 20 | 10.910 | $331,540 |
| | HREP O&M | Flow Rate (mgd) | 1.87 | $33,613 | 20 | 10.910 | $366,716 |
| | Screening O&M | Flow Rate (mgd) | 1.87 | $7,591 | 20 | 10.910 | $82,815 |
| | Disinfection O&M | Flow Rate (mgd) | 2.05 | $24,918 | 20 | 10.910 | $271,857 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,493 |
| | | | **Total Annual O&M** | **$97,000** | | **Total PW O&M** | **$1,068,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.05 | $30,389 | 20 | 10.910 | $331,540 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 1.87 | $210 | 20 | 10.910 | $2,290 |
| | Screening O&M | Flow Rate (mgd) | 1.87 | $7,591 | 20 | 10.910 | $82,815 |
| | Disinfection O&M | Flow Rate (mgd) | 2.05 | $24,918 | 20 | 10.910 | $271,857 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,407 |
| | | | **Total Annual O&M** | **$64,000** | | **Total PW O&M** | **$698,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 1.87 | $28,514 | 20 | 10.910 | $311,087 |
| | Screening O&M | Flow Rate (mgd) | 1.87 | $7,591 | 20 | 10.910 | $82,815 |
| | Disinfection O&M | Flow Rate (mgd) | 1.87 | $23,513 | 20 | 10.910 | $256,522 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,274 |
| | | | **Total Annual O&M** | **$60,000** | | **Total PW O&M** | **$661,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.62 | $25,929 | 20 | 10.910 | $282,884 |
| | Tank O&M | No. Events / Yr | 41 | $25,245 | 50 | 14.484 | $365,644 |
| | | Const Cost ($) | $22,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,570 | 20 | 10.910 | $82,590 |
| | Odor Control O&M | Capacity (cfm) | 40 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,031 |
| | | | **Total Annual O&M** | **$59,000** | | **Total PW O&M** | **$741,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.03 | $1,887 | 20 | 10.910 | $20,592 |
| | Tank O&M | No. Events / Yr | 41 | $27,723 | 50 | 14.484 | $401,527 |
| | | Const Cost ($) | $1,013,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,570 | 20 | 10.910 | $82,590 |
| | Odor Control O&M | Capacity (cfm) | 400 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,720 |
| | | | **Total Annual O&M** | **$39,000** | | **Total PW O&M** | **$523,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 1.62 | $25,929 | 20 | 10.910 | $282,884 |
| | Sed. Basin O&M | Flow Rate (mgd) | 1.62 | $182 | 50 | 14.484 | $2,637 |
| | Screening O&M | Flow Rate (mgd) | 1.62 | $7,570 | 20 | 10.910 | $82,590 |
| | Disinfection O&M | Flow Rate (mgd) | 1.62 | $21,561 | 20 | 10.910 | $235,228 |
| | Odor Control O&M | Capacity (cfm) | 300.00 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,122 |
| | | | **Total Annual O&M** | **$57,000** | | **Total PW O&M** | **$624,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 1.78 | $27,634 | 20 | 10.910 | $301,483 |
| | HREP O&M | Flow Rate (mgd) | 1.62 | $30,916 | 20 | 10.910 | $337,286 |
| | Screening O&M | Flow Rate (mgd) | 1.62 | $7,570 | 20 | 10.910 | $82,590 |
| | Disinfection O&M | Flow Rate (mgd) | 1.78 | $22,850 | 20 | 10.910 | $249,291 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,134 |
| | | | **Total Annual O&M** | **$90,000** | | **Total PW O&M** | **$986,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 1.78 | $27,634 | 20 | 10.910 | $301,483 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 1.62 | $182 | 20 | 10.910 | $1,986 |
| | Screening O&M | Flow Rate (mgd) | 1.62 | $7,570 | 20 | 10.910 | $82,590 |
| | Disinfection O&M | Flow Rate (mgd) | 1.78 | $22,850 | 20 | 10.910 | $249,291 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,154 |
| | | | **Total Annual O&M** | **$59,000** | | **Total PW O&M** | **$645,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 1.62 | $25,929 | 20 | 10.910 | $282,884 |
| | Screening O&M | Flow Rate (mgd) | 1.62 | $7,570 | 20 | 10.910 | $82,590 |
| | Disinfection O&M | Flow Rate (mgd) | 1.62 | $21,561 | 20 | 10.910 | $235,228 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,040 |
| | | | **Total Annual O&M** | **$56,000** | | **Total PW O&M** | **$611,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.04 | $19,248 | 20 | 10.910 | $209,994 |
| | Tank O&M | No. Events / Yr | 41 | $25,223 | 50 | 14.484 | $365,318 |
| | | Const Cost ($) | $13,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,522 | 20 | 10.910 | $82,060 |
| | Odor Control O&M | Capacity (cfm) | 30 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,021 |
| | | | **Total Annual O&M** | **$53,000** | | **Total PW O&M** | **$665,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.02 | $1,391 | 20 | 10.910 | $15,178 |
| | Tank O&M | No. Events / Yr | 41 | $27,633 | 50 | 14.484 | $400,224 |
| | | Const Cost ($) | $977,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,522 | 20 | 10.910 | $82,060 |
| | Odor Control O&M | Capacity (cfm) | 300 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,581 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$511,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 1.04 | $19,248 | 20 | 10.910 | $209,994 |
| | Sed. Basin O&M | Flow Rate (mgd) | 1.04 | $117 | 50 | 14.484 | $1,688 |
| | Screening O&M | Flow Rate (mgd) | 1.04 | $7,522 | 20 | 10.910 | $82,060 |
| | Disinfection O&M | Flow Rate (mgd) | 1.04 | $16,431 | 20 | 10.910 | $179,265 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,052 |
| | | | **Total Annual O&M** | **$45,000** | | **Total PW O&M** | **$488,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 1.14 | $20,513 | 20 | 10.910 | $223,800 |
| | HREP O&M | Flow Rate (mgd) | 1.04 | $23,783 | 20 | 10.910 | $259,473 |
| | Screening O&M | Flow Rate (mgd) | 1.04 | $7,522 | 20 | 10.910 | $82,060 |
| | Disinfection O&M | Flow Rate (mgd) | 1.14 | $17,414 | 20 | 10.910 | $189,982 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,080 |
| | | | **Total Annual O&M** | **$70,000** | | **Total PW O&M** | **$768,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 1.14 | $20,513 | 20 | 10.910 | $223,800 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 1.04 | $117 | 20 | 10.910 | $1,272 |
| | Screening O&M | Flow Rate (mgd) | 1.04 | $7,522 | 20 | 10.910 | $82,060 |
| | Disinfection O&M | Flow Rate (mgd) | 1.14 | $17,414 | 20 | 10.910 | $189,982 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,348 |
| | | | **Total Annual O&M** | **$46,000** | | **Total PW O&M** | **$504,000** |

| ACSO 021AO10 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 1.04 | $19,248 | 20 | 10.910 | $209,994 |
| | Screening O&M | Flow Rate (mgd) | 1.04 | $7,522 | 20 | 10.910 | $82,060 |
| | Disinfection O&M | Flow Rate (mgd) | 1.04 | $16,431 | 20 | 10.910 | $179,265 |
| | Odor Control O&M | Capacity (cfm) | 20.00 | $70 | 20 | 10.910 | $764 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,992 |
| | | | **Total Annual O&M** | **$44,000** | | **Total PW O&M** | **$479,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $1.1 | $1,095,000 | $0 |
| 1 | $1.1 | $1,095,000 | $0 |
| 2 | $1.1 | $1,095,000 | $0 |
| 4 | $1.1 | $1,095,000 | $0 |
| 6 | $1.1 | $1,095,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.8 | $2,225,000 | $551,000 |
| 1 | $2.7 | $2,145,000 | $541,000 |
| 2 | $2.6 | $2,082,000 | $535,000 |
| 4 | $2.5 | $2,011,000 | $523,000 |
| 6 | $2.4 | $1,927,000 | $511,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.6 | $2,689,000 | $904,000 |
| 1 | $3.4 | $2,558,000 | $850,000 |
| 2 | $3.2 | $2,387,000 | $770,000 |
| 4 | $3.1 | $2,316,000 | $741,000 |
| 6 | $2.5 | $1,801,000 | $665,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.1 | $4,053,000 | $1,000,000 |
| 1 | $4.0 | $3,182,000 | $844,000 |
| 2 | $3.7 | $2,984,000 | $698,000 |
| 4 | $3.6 | $2,916,000 | $645,000 |
| 6 | $3.0 | $2,456,000 | $504,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.5 | $5,055,000 | $1,445,000 |
| 1 | $6.1 | $4,811,000 | $1,294,000 |
| 2 | $5.5 | $4,473,000 | $1,068,000 |
| 4 | $5.3 | $4,357,000 | $986,000 |
| 6 | $4.5 | $3,781,000 | $768,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $20.4 | $19,462,000 | $917,000 |
| 1 | $20.1 | $19,324,000 | $820,000 |
| 2 | $19.8 | $19,134,000 | $678,000 |
| 4 | $19.7 | $19,064,000 | $624,000 |
| 6 | $19.0 | $18,537,000 | $488,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.2 | $3,297,000 | $891,000 |
| 1 | $3.9 | $3,145,000 | $798,000 |
| 2 | $3.6 | $2,934,000 | $661,000 |
| 4 | $3.5 | $2,863,000 | $611,000 |
| 6 | $2.8 | $2,320,000 | $479,000 |

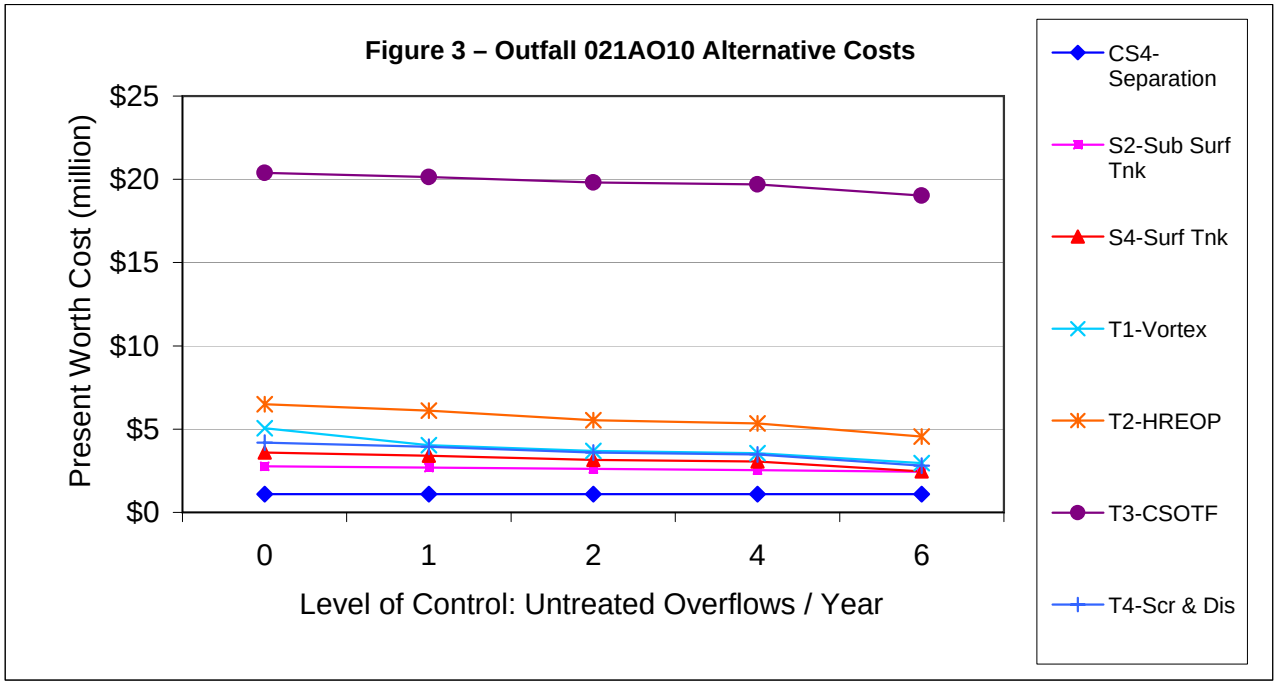
Figure 3 – Outfall 021AO10 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 021AO10 |
| **Location Name** | Earl Street (W. Carson Street) |
| **Model ID** | ADC 021A010-FG.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 021AO10 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 41 | |
| Peak Volume: | 8,334 | $ft^3$ |
| | 0.06 | MG |
| Total Volume: | 61,925 | $ft^3$ |
| | 0.46 | MG |
| Peak Rate: | 4.88 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 7/12/2005 18:50 | 109 | 7/12/2005 20:00 | 8334.09 | 62.343 | 0 | 4.88 | 0 |
| 1/14/2005 0:02 | 202 | 1/14/2005 2:00 | 6730.36 | 50.346 | 1 | 0.78 | 12 |
| 1/5/2005 13:57 | 825 | 1/5/2005 14:45 | 5917.12 | 44.263 | 2 | 0.40 | 22 |
| 8/20/2005 18:10 | 72 | 8/20/2005 18:30 | 4763.95 | 35.637 | 3 | 2.89 | 2 |
| 7/5/2005 16:15 | 39 | 7/5/2005 16:30 | 4285.28 | 32.056 | 4 | 4.03 | 1 |
| 1/8/2005 4:50 | 178 | 1/8/2005 5:15 | 3272.73 | 24.482 | 5 | 1.01 | 9 |
| 6/11/2005 17:35 | 35 | 6/11/2005 18:00 | 2714.45 | 20.305 | 6 | 2.50 | 4 |
| 5/14/2005 16:00 | 33 | 5/14/2005 16:15 | 2301.80 | 17.219 | 7 | 2.58 | 3 |
| 5/13/2005 22:40 | 128 | 5/13/2005 23:45 | 2166.38 | 16.206 | 8 | 0.68 | 13 |
| 11/14/2005 21:47 | 389 | 11/15/2005 3:45 | 1951.87 | 14.601 | 9 | 0.53 | 17 |
| 11/29/2005 6:37 | 341 | 11/29/2005 11:15 | 1888.05 | 14.124 | 10 | 0.45 | 19 |
| 1/11/2005 8:48 | 555 | 1/11/2005 9:45 | 1856.32 | 13.886 | 11 | 0.25 | 26 |
| 1/5/2005 3:06 | 265 | 1/5/2005 5:00 | 1766.99 | 13.218 | 12 | 0.25 | 27 |
| 7/26/2005 19:35 | 40 | 7/26/2005 20:00 | 1370.52 | 10.252 | 13 | 1.25 | 7 |
| 5/23/2005 16:15 | 23 | 5/23/2005 16:30 | 1315.91 | 9.844 | 14 | 1.77 | 5 |
| 4/23/2005 3:20 | 88 | 4/23/2005 3:45 | 1298.60 | 9.714 | 15 | 0.85 | 11 |
| 11/9/2005 19:15 | 32 | 11/9/2005 19:30 | 1198.41 | 8.965 | 16 | 1.60 | 6 |
| 1/12/2005 1:01 | 161 | 1/12/2005 1:30 | 1086.17 | 8.125 | 17 | 0.44 | 20 |
| 9/29/2005 5:15 | 37 | 9/29/2005 5:45 | 1041.12 | 7.788 | 18 | 0.91 | 10 |
| 3/24/2005 9:30 | 22 | 3/24/2005 9:45 | 825.88 | 6.178 | 19 | 1.11 | 8 |
| 7/15/2005 17:50 | 48 | 7/15/2005 18:00 | 797.72 | 5.967 | 20 | 0.54 | 16 |
| 8/29/2005 9:36 | 222 | 8/29/2005 13:00 | 746.74 | 5.586 | 21 | 0.58 | 14 |
| 5/11/2005 22:35 | 90 | 5/11/2005 22:45 | 679.50 | 5.083 | 22 | 0.44 | 21 |
| 10/25/2005 2:04 | 135 | 10/25/2005 4:00 | 595.39 | 4.454 | 23 | 0.18 | 30 |
| 4/2/2005 6:18 | 225 | 4/2/2005 6:30 | 451.51 | 3.377 | 24 | 0.18 | 29 |
| 7/25/2005 13:05 | 28 | 7/25/2005 13:15 | 391.61 | 2.929 | 25 | 0.57 | 15 |
| 1/3/2005 13:06 | 433 | 1/3/2005 14:00 | 303.70 | 2.272 | 26 | 0.07 | 39 |
| 3/28/2005 10:01 | 111 | 3/28/2005 10:15 | 295.26 | 2.209 | 27 | 0.10 | 36 |
| 12/15/2005 13:46 | 26 | 12/15/2005 14:00 | 275.38 | 2.060 | 28 | 0.36 | 23 |
| 6/10/2005 21:20 | 17 | 6/10/2005 21:30 | 252.02 | 1.885 | 29 | 0.51 | 18 |
| 5/28/2005 8:41 | 40 | 5/28/2005 9:00 | 198.72 | 1.486 | 30 | 0.12 | 33 |
| 7/17/2005 16:05 | 25 | 7/17/2005 16:15 | 179.78 | 1.345 | 31 | 0.27 | 25 |
| 2/9/2005 16:22 | 27 | 2/9/2005 16:45 | 175.39 | 1.312 | 32 | 0.19 | 28 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 11/16/2005 4:05 | 15 | 11/16/2005 4:15 | 142.66 | 1.067 | 33 | 0.28 | 24 |
| 2/20/2005 19:46 | 26 | 2/20/2005 20:00 | 135.50 | 1.014 | 34 | 0.14 | 32 |
| 6/14/2005 18:56 | 36 | 6/14/2005 19:00 | 66.33 | 0.496 | 35 | 0.12 | 35 |
| 8/27/2005 15:26 | 8 | 8/27/2005 15:30 | 42.66 | 0.319 | 36 | 0.15 | 31 |
| 4/20/2005 23:07 | 11 | 4/20/2005 23:15 | 37.63 | 0.281 | 37 | 0.08 | 38 |
| 6/28/2005 18:11 | 8 | 6/28/2005 18:15 | 34.23 | 0.256 | 38 | 0.12 | 34 |
| 4/30/2005 4:41 | 7 | 4/30/2005 4:45 | 24.35 | 0.182 | 39 | 0.09 | 37 |
| 3/23/2005 12:40 | 6 | 3/23/2005 12:45 | 13.28 | 0.099 | 40 | 0.04 | 40 |

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# Region 1

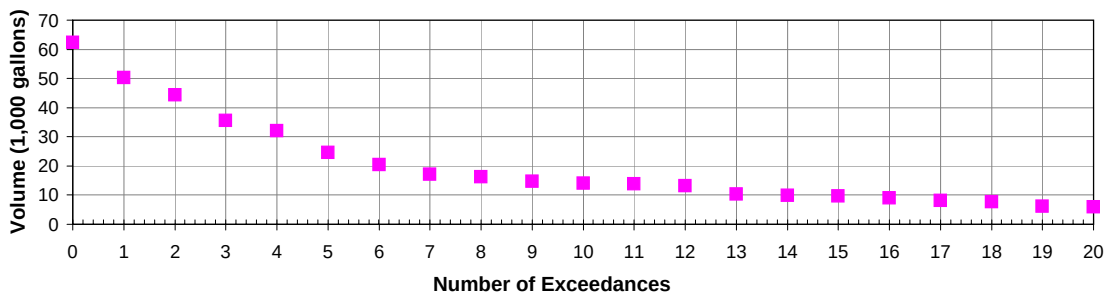
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 021AO10 |
| **Location Name** | Earl Street (W. Carson Street) |
| **Model ID** | ADC 021A010-FG.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Glen Mawr (Ohio River) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 021AO10 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

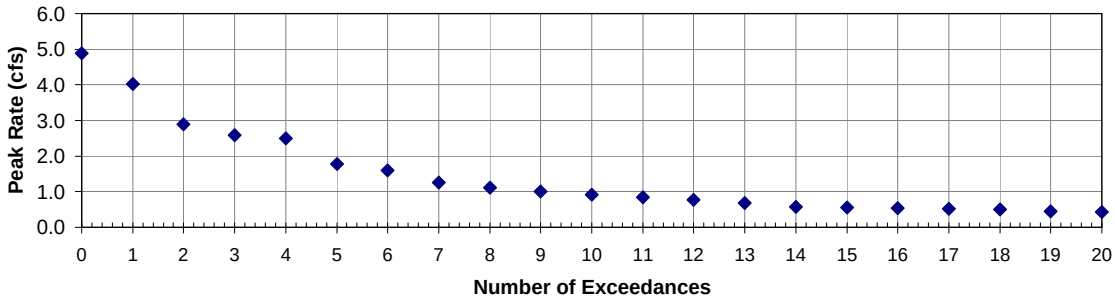
**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 41 | |
| Peak Volume: | 8,334 | $ft^3$ |
| | 0.06 | MG |
| Total Volume: | 61,925 | $ft^3$ |
| | 0.46 | MG |
| Peak Rate: | 4.88 | cfs |

### Figure 1 - Outfall 021AO10 CSO Volume




### Figure 2 - Outfall 021AO10 CSO Peak Flow Rate



## D.25.3 O-10 – GLEN MAWR SEWERSHED – NPDES# 021AO10

### Description of Outfall

Outfall 021AO10 conveys overflows from the ALCOSAN diversion chamber O-10 to the Ohio River. The outfall is located along east of West Carson Street south of Corks Run in the City of Pittsburgh. The outfall is located approximately 200 feet east of West Carson Street. The tributary sewershed is 7 acres of residential, business and commercial users. The outfall is located in the Glen Mawr sewershed which is comprised of approximately 540 manholes and 135,718 linear feet (25.7 miles) of mostly combined sewer up to 120 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 021AO10 typically experiences 41 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 021AO10 is approximately 0.06 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 021AO10 is approximately 4.88 CFS. *Figure 1 – Outfall 021AO10 CSO Volume* and *Figure 2 – Outfall 021AO10 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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**Figure 1 - Outfall 021AO10 CSO Volume**

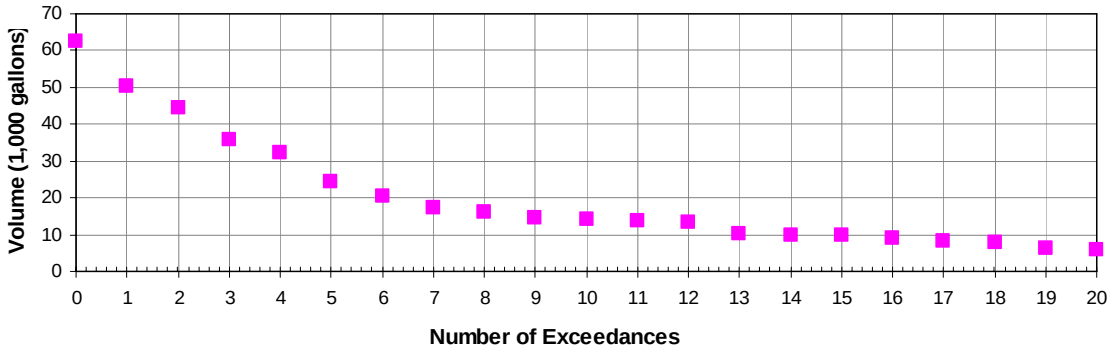
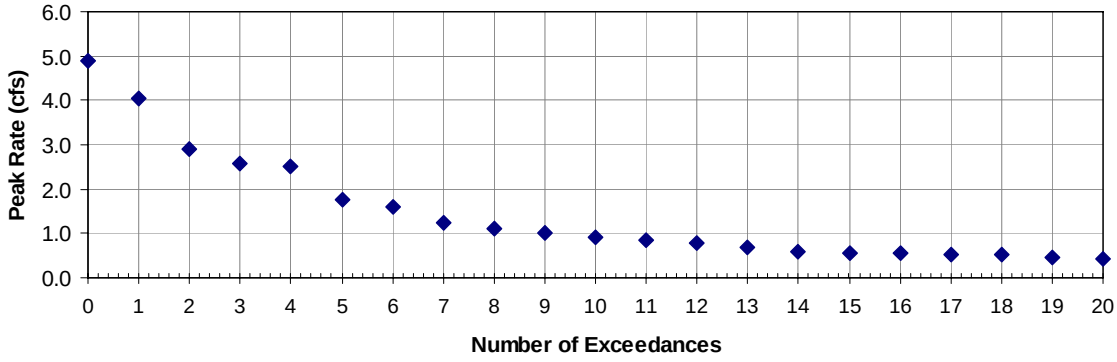



**Figure 2 - Outfall 021AO10 CSO Peak Flow Rate**



There appears to be a limited amount of available space for potential storage or treatment facilities in the area between the existing railroad tracks and the Ohio River. The site is generally bounded by the Ohio River to the east, railroad tracks and Carson Street to the west and undeveloped property to the north and south (bank of the Ohio River). Within the boundaries of this critical infrastructure, there appears to be potential space for a storage or treatment facility.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 021AO10. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-021AO10: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-021AO10: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

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S4-021AO10: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-021AO10: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-021AO10: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-021AO10: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

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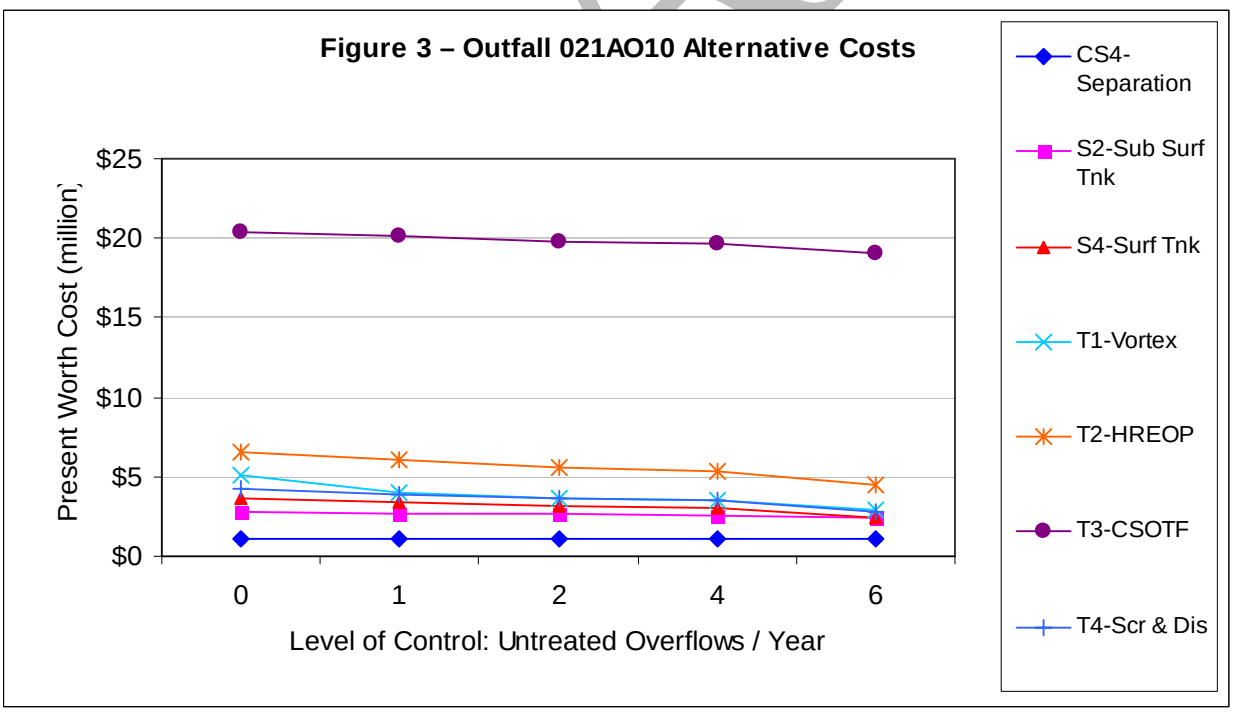
T4-021AO10: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 021AO10 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.



The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative CS4-021AO10: Sewer Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

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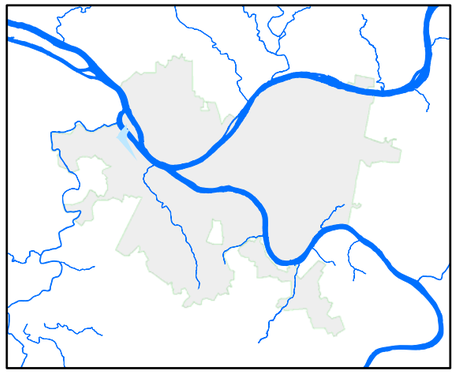

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

150 0 150
Feet

# Attachment 1
# O-10
# Tributary Area Map
# Glen Mawr Sewershed

CSO Controls Alternatives

SW-D-0202.pdf

# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 7 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening in conjunction with storage and treatment alternatives will be evaluated. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection in conjunction with treatment alternatives will be evaluated. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation will be evaluated and will include screening and disinfection. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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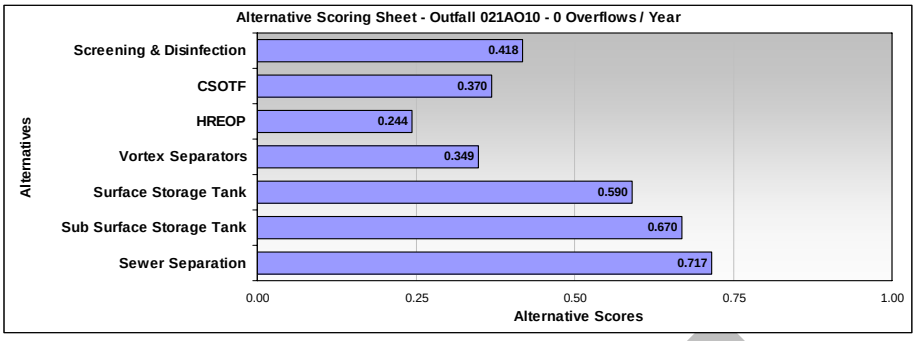
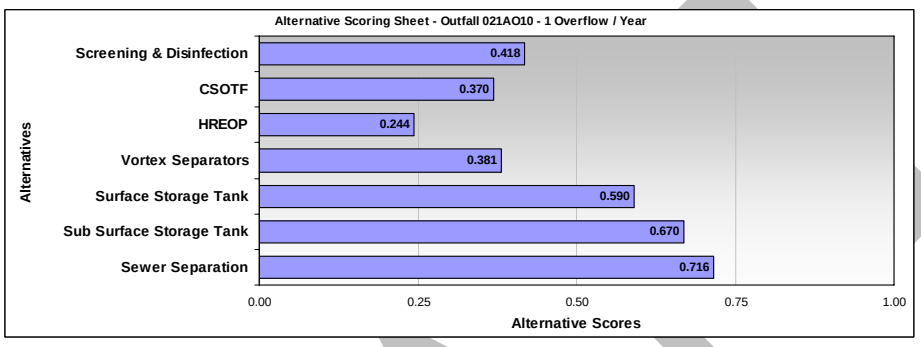
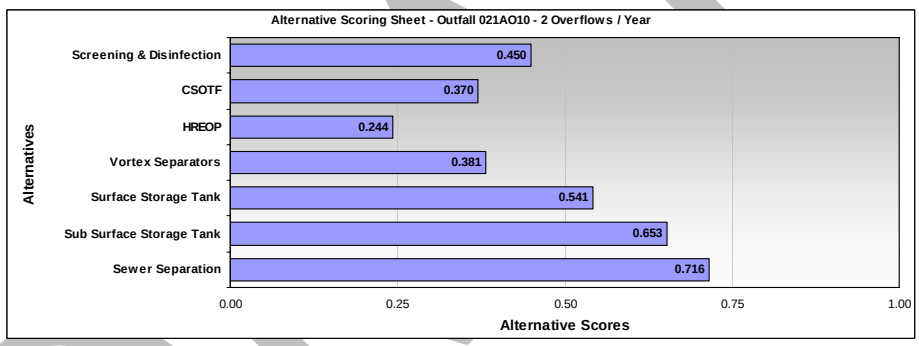
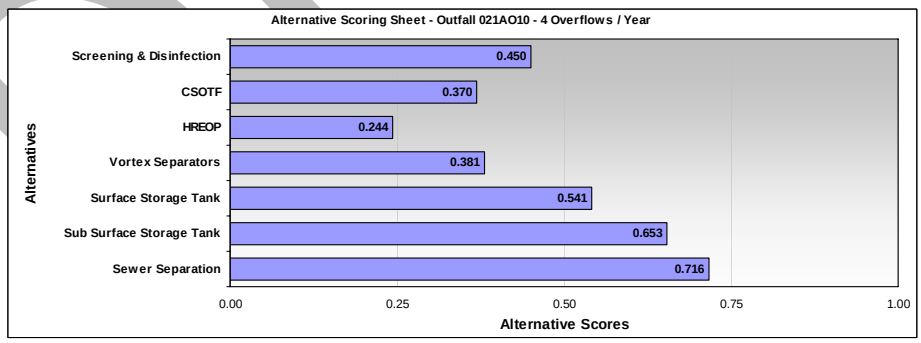
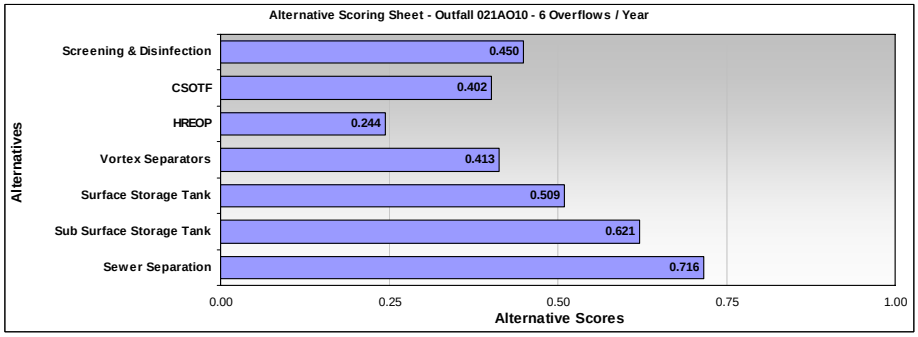
# Attachment 3 – Alternative Scoring Sheet

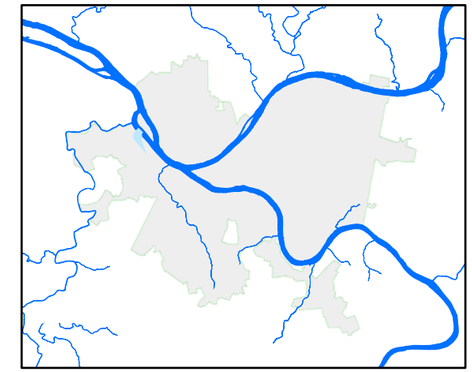




Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# O-10
# Facilities Boundary Map
# Glen Mawr
# Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0202.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 2 | 2 | 3 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 3 | 3 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 3 | 3 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 3 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 3 | 3 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.696** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 0 | -0.25 | 0.053 | -0.013 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.572** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.571** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.846** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.830** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.830** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.830** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.627** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.627** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.610** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.647** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.615** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.509** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.472** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.472** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.546** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.546** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.273** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.273** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.273** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.273** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.273** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.441** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.367** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.367** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.367** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.367** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.675** |

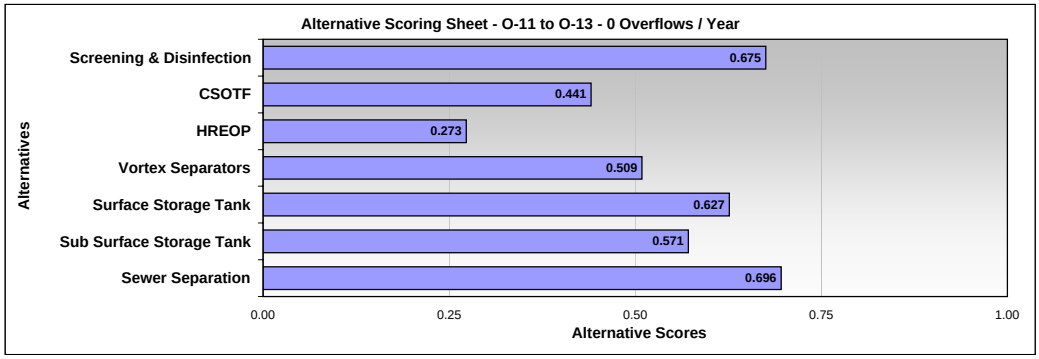
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.602** |

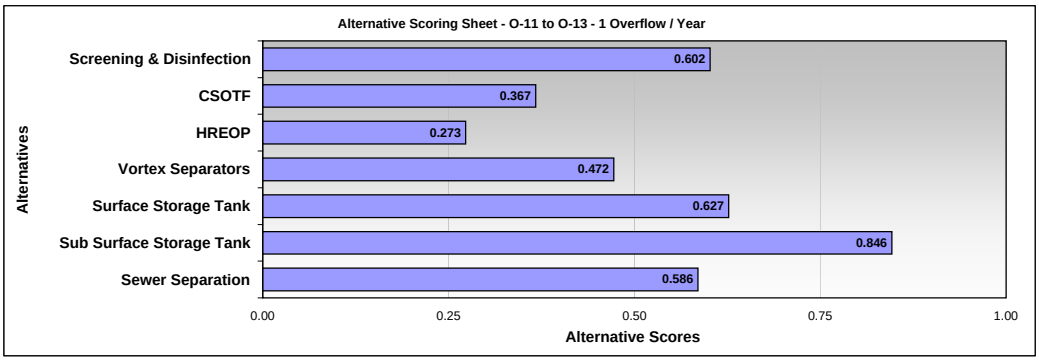
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.602** |

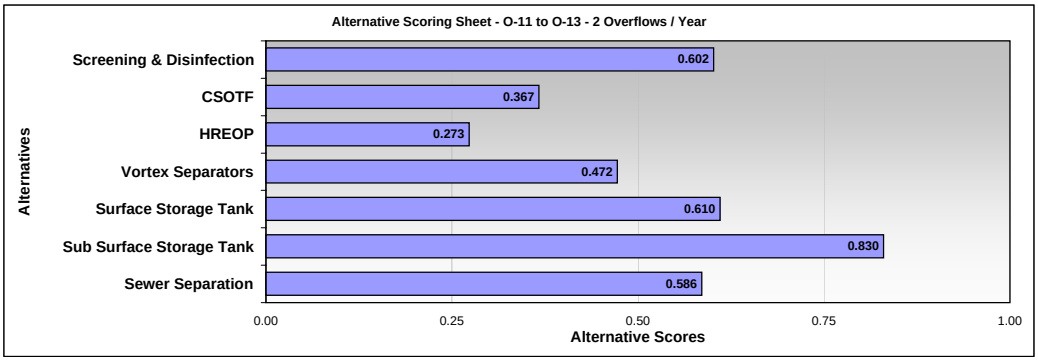
Total Score

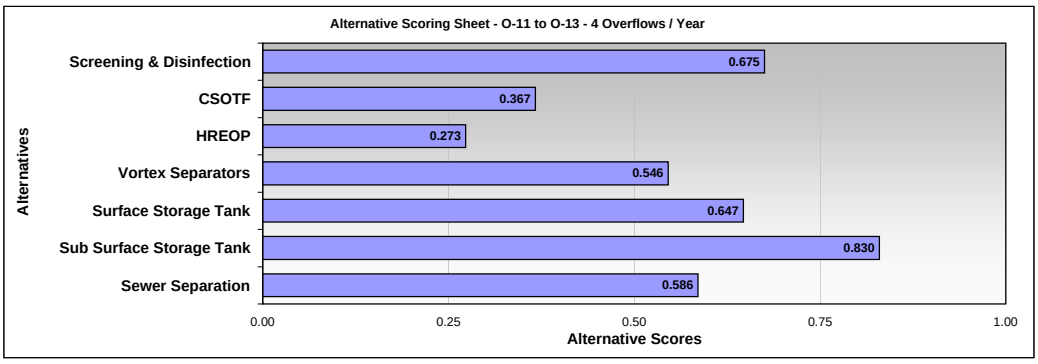
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.675** |

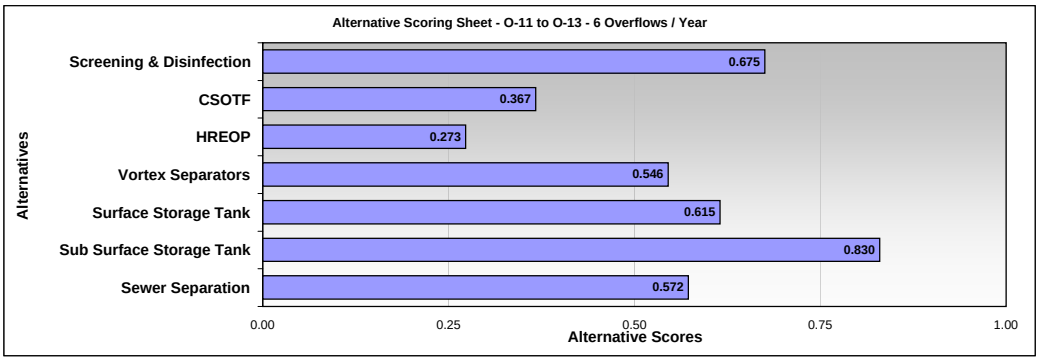
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.675** |


Alternative Scoring Sheet - O-11 to O-13 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.675
0.441
0.273
0.509
0.627
0.571
0.696
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-11 to O-13 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.602
0.367
0.273
0.472
0.627
0.846
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-11 to O-13 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.602
0.367
0.273
0.472
0.610
0.830
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-11 to O-13 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.675
0.367
0.273
0.546
0.647
0.830
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-11 to O-13 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.675
0.367
0.273
0.546
0.615
0.830
0.572
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | |
|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | |
| **0 Overflows / Year** | | | |
| **1. Consolidation Sewer Parameters** | | | |
| Total Consolidation Pipe (Ft) | | 1,260 | Input by Engineer |
| Peak Flow (CFS) | | 145.64 | 25% of Peak Flow Rate |
| Diameter (In) | | 78 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 503,000 | |
| Peak Flow (CFS) | | 291.28 | 50% of Peak Flow Rate |
| Diameter (In) | | 108 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 845,000 | |
| Peak Flow (CFS) | | 436.91 | 75% of Peak Flow Rate |
| Diameter (In) | | 120 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 1,011,000 | |
| Peak Flow (CFS) | | 582.55 | 100% of Peak Flow Rate |
| Diameter (In) | | 120 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 1,011,000 | |
| **Construction Cost (Consolidation Sewers)** | **$** | **3,370,000** | |
| **2. Interceptor Connection Parameters** | | | |
| Diameter (In) | | 24 | |
| Number Connections | | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 48 | |
| Number Connections | | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 72 | |
| Number Connections | | - | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 120 | |
| Number Connections | | 1 | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 171,000 | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **171,000** | |
| **3. Land Acquisition Parameters** | | | |
| Land Acquisition - Consolidation Sewers (SF) | | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | |
| | | **TOTAL CAPITAL COST** | **$ 3,541,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 759 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **113,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 330,620 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **661,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 114,550,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SURFACE STORAGE TANK** | | | |
| **0 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 27.09 | 3,622,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 31.87 | 4,261,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 654 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 436 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 31.99 | 4,277,160 | **Sufficient Volume** |
| Tank Area (SF) | 285,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **34,364,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 376.49 | 582.55 | = Peak Rate |
| Force Main Diameter (In) | 133 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 47,583,000** | **$ -** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 582.55 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | Input by Engineer |
| Depth (Ft) | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 6,392,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 31,960 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$ 1,383,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 376.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 17,844,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 27.09 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 13.54 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 14,590,044** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 423,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 846,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 120,450,044** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 27.09 | 3,622,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 31.87 | 4,261,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 654 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 436 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 31.99 | 4,277,160 | **Sufficient Volume** |
| Tank Area (SF) | | 285,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **84,339,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 27.09 | 41.92 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 36 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,956,000** | **$ 44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 582.55 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,392,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 319,600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **8,403,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 376.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **17,844,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 27.09 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 13.54 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **14,590,044** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 423,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **846,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **134,862,044** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 376.49 | 582.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 40 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **11,315,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 414.14 | 640.81 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 140 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **52,176,000** | **$ 199,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 582.55 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,154,000 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 57,700 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,197,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 376.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **17,844,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 414.14 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 318 | 152 | |
| Passes / Detention (Min) | | 7 | **15.09** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,847,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 391,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **782,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **92,200,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 376.49 | 582.55 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 62,800 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 355 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 178 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 5.67 | 758,280 | |
| **Construction Cost (CSOTF)** | **$** | **21,509,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 376.49 | 582.55 | = Peak Rate |
| Force Main Diameter (In) | | 133 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **47,583,000** | **$ 186,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 582.55 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,137,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 56,850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,172,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 376.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **17,844,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 376.49 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 303 | 145 | |
| Passes / Detention (Min) | | 7 | **15.08** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,633,000** | | |
| **7. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 5.67 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 2.84 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,377,232** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **9. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 157,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **314,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **106,458,232** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 376.49 | | 582.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 4,430 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 95 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 48 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **74,108,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 414.14 | | 640.81 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 140 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **52,176,000** | **$** | **199,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 582.55 | | | Ref: Technical Parameters |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 109,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 5,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **346,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 376.49 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **17,844,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 414.14 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 318 | | 152 | |
| Passes / Detention (Min) | 7 | | **15.09** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 3,847,000 | $ | 7,175,000 | |
| **Construction Cost (Disinfection) $** | **11,022,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 197,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **394,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **159,929,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,621,560 | CF |
| | 27.09 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 582.55 | CFS |
| | 376.49 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow, into facility (MGD) | | 376.49 | 582.55 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **17,844,000** | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 376.49 | 582.55 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 133 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **47,583,000** | **$ 186,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 582.55 | | Ref: CSO Statistics |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 116,500 | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 5,830 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **364,000** | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow (MGD) | | 376.49 | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 303 | 145 | |
| Passes / Detention (Min) | | 7 | **15.08** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 3,633,000 | $ 6,623,000 | |
| **Construction Cost (Disinfection)** | **$** | **10,256,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | | 63,000 | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **126,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **80,199,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Consolidation Sewer Parameters** | | | | |
| Total Consolidation Pipe (Ft) | | 1,260 | | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 145.64 | | 25% of Peak Flow Rate |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 503,000 | | |
| Peak Flow (CFS) | | 291.28 | | 50% of Peak Flow Rate |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 845,000 | | |
| Peak Flow (CFS) | | 436.91 | | 75% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| Peak Flow (CFS) | | 582.55 | | 100% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| **Construction Cost (Consolidation Sewers)** | **$** | **3,370,000** | | |
| **2. Interceptor Connection Parameters** | | | | |
| Diameter (In) | | 24 | | |
| Number Connections | | - | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | |
| Number Connections | | - | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 72 | | |
| Number Connections | | - | | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | |
| Number Connections | | 1 | | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 171,000 | | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **171,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,541,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 759 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **113,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 330,620 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **661,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 114,511,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SURFACE STORAGE TANK** | | | |
| **1 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 7.57 | 1,012,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 8.90 | 1,191,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 346 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 231 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 8.97 | 1,198,890 | **Sufficient Volume** |
| Tank Area (SF) | 80,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **8,560,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 288.28 | 446.07 | = Peak Rate |
| Force Main Diameter (In) | 117 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | - | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **36,822,000** | **$ -** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 446.07 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 1,787,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 8,940 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **509,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 288.28 | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **13,760,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 7.57 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.78 | | = Peak Vol/DW Time |
| **Construction Cost $** | **9,837,745** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 132,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **264,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 73,592,745** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | |
| **1 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 7.57 | 1,012,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 8.90 | 1,191,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 346 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 231 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 8.97 | 1,198,890 | **Sufficient Volume** |
| Tank Area (SF) | 80,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **24,219,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 7.57 | 11.71 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 19 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 2,548,000** | **$ 27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 446.07 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 1,787,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 89,350 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 3,095,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 288.28 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 13,760,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 7.57 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.78 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 9,837,745** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 132,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 264,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 57,590,745** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **1 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 288.28 | | 446.07 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 317.11 | | 490.67 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 122 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **40,339,000** | **$** | **166,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 446.07 | | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 288.28 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **13,760,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 317.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 278 | | 133 | |
| Passes | | 7 | | **15.07** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,278,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 299,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **598,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | **61,981,000** | |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 288.28 | 446.07 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 48,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 311 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 156 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 4.35 | 582,192 | |
| **Construction Cost (CSOTF)** | **$** | **19,260,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 288.28 | 446.07 | = Peak Rate |
| Force Main Diameter (In) | | 117 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **36,822,000** | **$ 157,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 446.07 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 873,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 43,650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **1,765,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 288.28 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **13,760,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 288.28 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 265 | 127 | |
| Passes | | 7 | **15.09** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,096,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 7.57 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 3.78 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,837,745** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 122,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **244,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **88,781,745** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **1 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 288.28 | | 446.07 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 3,400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 83 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 42 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **54,483,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 317.11 | | 490.67 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 122 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **40,339,000** | **$** | **166,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 446.07 | | | Ref: Technical Parameters |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 84,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 4,200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **282,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 288.28 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **13,760,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 317.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 278 | | 133 | |
| Passes | 7 | | **15.07** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 3,278,000 | $ | 5,742,000 | |
| **Construction Cost (Disinfection) $** | **9,020,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 156,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **312,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **122,202,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,011,662 | CF |
| | 7.57 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 446.07 | CFS |
| | 288.28 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 288.28 | | 446.07 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 13,760,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 288.28 | | 446.07 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 117 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 36,822,000** | **$** | **157,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 446.07 | | | Ref: CSO Statistics |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 89,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 4,460 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 295,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 288.28 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 265 | | 127 | |
| Passes | 7 | | **15.09** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ 3,096,000 | $ | 5,317,000 | |
| **Construction Cost (Disinfection)** | **$ 8,413,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 53,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 106,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **63,393,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Consolidation Sewer Parameters** | | | | |
| Total Consolidation Pipe (Ft) | | 1,260 | | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 145.64 | | 25% of Peak Flow Rate |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 503,000 | | |
| Peak Flow (CFS) | | 291.28 | | 50% of Peak Flow Rate |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 845,000 | | |
| Peak Flow (CFS) | | 436.91 | | 75% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| Peak Flow (CFS) | | 582.55 | | 100% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| **Construction Cost (Consolidation Sewers)** | **$** | **3,370,000** | | |
| **2. Interceptor Connection Parameters** | | | | |
| Diameter (In) | | 24 | | |
| Number Connections | | - | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | |
| Number Connections | | - | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 72 | | |
| Number Connections | | - | | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | |
| Number Connections | | 1 | | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 171,000 | | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **171,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,541,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 759 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **113,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 330,620 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **661,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 114,511,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SURFACE STORAGE TANK** | | | |
| **2 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 7.13 | 953,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 8.38 | 1,121,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 336 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 224 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 8.44 | 1,128,960 | **Sufficient Volume** |
| Tank Area (SF) | 75,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **8,018,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 273.58 | 423.33 | = Peak Rate |
| Force Main Diameter (In) | 114 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | - | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 35,029,000** | **$ -** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 423.33 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 1,682,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 8,410 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$ 486,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 273.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 13,079,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 7.13 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.56 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 9,730,780** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 125,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 250,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 70,432,780** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | |
| **2 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 7.13 | 953,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 8.38 | 1,121,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 336 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 224 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 8.44 | 1,128,960 | **Sufficient Volume** |
| Tank Area (SF) | 75,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **22,863,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 7.13 | 11.03 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 18 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 2,494,000** | **$ 26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 423.33 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 1,682,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 84,100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 2,951,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 273.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 13,079,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 7.13 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.56 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 9,730,780** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 125,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 250,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 55,233,780** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 273.58 | 423.33 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 300.94 | 465.66 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 119 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **38,367,000** | **$ 161,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 423.33 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 273.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **13,079,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 300.94 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 271 | 130 | |
| Passes | | 7 | **15.13** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,177,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 284,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **568,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **59,192,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 273.58 | 423.33 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 45,600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 303 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 151 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 4.11 | 549,036 | |
| **Construction Cost (CSOTF)** | **$** | **18,909,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 273.58 | 423.33 | = Peak Rate |
| Force Main Diameter (In) | | 114 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **35,029,000** | **$ 152,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 423.33 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 824,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 41,200 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **1,687,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 273.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **13,079,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 273.58 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 259 | 124 | |
| Passes | | 7 | **15.17** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **3,000,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 7.13 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 3.56 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,730,780** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 116,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **232,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 85,658,780** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **2 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 273.58 | | 423.33 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 3,220 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 81 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 41 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **51,365,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 300.94 | | 465.66 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 119 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **38,367,000** | **$** | **161,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 423.33 | | | Ref: Technical Parameters |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 80,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 4,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **271,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 273.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **13,079,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 300.94 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 271 | | 130 | |
| Passes | 7 | | **15.13** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 3,177,000 | $ | 5,518,000 | |
| **Construction Cost (Disinfection) $** | **8,695,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 149,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **298,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **116,076,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 952,816 | CF |
| | 7.13 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 423.33 | CFS |
| | 273.58 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 273.58 | | 423.33 | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **13,079,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 273.58 | | 423.33 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 114 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **35,029,000** | **$** | **152,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 423.33 | | | Ref: CSO Statistics |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 84,700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 4,240 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **284,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 273.58 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 259 | | 124 | |
| Passes | 7 | | **15.17** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 3,000,000 | $ | 5,119,000 | |
| **Construction Cost (Disinfection) $** | **8,119,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 52,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **104,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **60,607,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Consolidation Sewer Parameters** | | | | |
| Total Consolidation Pipe (Ft) | | 1,260 | | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 145.64 | | 25% of Peak Flow Rate |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 503,000 | | |
| Peak Flow (CFS) | | 291.28 | | 50% of Peak Flow Rate |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 845,000 | | |
| Peak Flow (CFS) | | 436.91 | | 75% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| Peak Flow (CFS) | | 582.55 | | 100% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| **Construction Cost (Consolidation Sewers)** | **$** | **3,370,000** | | |
| **2. Interceptor Connection Parameters** | | | | |
| Diameter (In) | | 24 | | |
| Number Connections | | - | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | |
| Number Connections | | - | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 72 | | |
| Number Connections | | - | | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | |
| Number Connections | | 1 | | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 171,000 | | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **171,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,541,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 759 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **113,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 330,620 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **661,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **114,511,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 6.12 | 818,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 7.20 | 962,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 311 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 208 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 7.26 | 970,320 | **Sufficient Volume** |
| Tank Area (SF) | | 65,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **6,793,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 197.33 | 305.34 | = Peak Rate |
| Force Main Diameter (In) | | 97 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | - | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **25,726,000** | **$ -** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 305.34 | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,443,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 7,220 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **431,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 197.33 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **9,549,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 6.12 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 3.06 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,486,266** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 110,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **220,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **56,045,266** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | |
| **4 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 6.12 | 818,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 7.20 | 962,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 311 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 208 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 7.26 | 970,320 | **Sufficient Volume** |
| Tank Area (SF) | 65,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **19,764,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 6.12 | 9.47 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 17 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,362,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 305.34 | | Ref: Technical Parameters |
| Diameter (In) | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 1,443,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 72,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **2,617,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 197.33 | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **9,549,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 6.12 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.06 | | = Peak Vol/DW Time |
| **Construction Cost $** | **9,486,266** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 110,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **220,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 47,863,266** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **4 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 197.33 | | 305.34 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 217.06 | | 335.87 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 101 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **28,133,000** | **$** | **130,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 305.34 | | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 197.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **9,549,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 217.06 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 230 | | 110 | |
| Passes | | 7 | | **15.07** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,612,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 205,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **410,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **44,674,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 197.33 | | 305.34 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 32,900 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 258 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 129 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 2.99 | | 399,384 | |
| **Construction Cost (CSOTF) $** | **17,605,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 197.33 | | 305.34 | = Peak Rate |
| Force Main Diameter (In) | 97 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **25,726,000** | **$** | **124,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 305.34 | | | Ref: Technical Parameters |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 599,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 29,950 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **1,314,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 197.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **9,549,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 197.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 220 | | 105 | |
| Passes | 7 | | **15.13** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **2,613,000** | | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | 6.12 | | | Sed Basin Volume |
| Dewatering Time (Days) | 2 | | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 3.06 | | | = Peak Vol/DW Time |
| **Construction Cost $** | **9,486,266** | | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 85,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **170,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **70,427,266** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 197.33 | | 305.34 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 2,330 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 69 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 35 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **35,879,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 217.06 | | 335.87 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 101 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **28,133,000** | **$** | **130,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 305.34 | | | Ref: Technical Parameters |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 58,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 2,900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **211,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 197.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **9,549,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 217.06 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 230 | | 110 | |
| Passes | 7 | | **15.07** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 2,612,000 | $ | 4,230,000 | |
| **Construction Cost (Disinfection) $** | **6,842,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 114,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **228,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **84,812,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 818,280 | CF |
| | 6.12 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 305.34 | CFS |
| | 197.33 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 197.33 | | 305.34 | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **9,549,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 197.33 | | 305.34 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 97 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **25,726,000** | **$** | **124,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 305.34 | | | Ref: CSO Statistics |
| Diameter (In) | 120 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 61,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 3,060 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **220,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 197.33 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 220 | | 105 | |
| Passes | 7 | | **15.13** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 2,613,000 | $ | 3,938,000 | |
| **Construction Cost (Disinfection) $** | **6,551,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 44,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **88,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **46,098,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Consolidation Sewer Parameters** | | | | |
| Total Consolidation Pipe (Ft) | | 1,260 | | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 145.64 | | 25% of Peak Flow Rate |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 503,000 | | |
| Peak Flow (CFS) | | 291.28 | | 50% of Peak Flow Rate |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 845,000 | | |
| Peak Flow (CFS) | | 436.91 | | 75% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| Peak Flow (CFS) | | 582.55 | | 100% of Peak Flow Rate |
| Diameter (In) | | 120 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 315 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 1,011,000 | | |
| **Construction Cost (Consolidation Sewers)** | **$** | **3,370,000** | | |
| **2. Interceptor Connection Parameters** | | | | |
| Diameter (In) | | 24 | | |
| Number Connections | | - | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | |
| Number Connections | | - | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 72 | | |
| Number Connections | | - | | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 120 | | |
| Number Connections | | 1 | | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 171,000 | | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **171,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | | **TOTAL CAPITAL COST** | **$ 3,541,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 759 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **113,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 330,620 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **661,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 114,511,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 5.50 | 735,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 6.47 | 865,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 295 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 197 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 6.52 | 871,725 | **Sufficient Volume** |
| Tank Area (SF) | | 58,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **6,046,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 179.67 | 278.00 | = Peak Rate |
| Force Main Diameter (In) | | 92 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | - | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,571,000** | **$ -** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 278.00 | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,298,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 6,490 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **396,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 179.67 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 5.50 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 2.75 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,335,524** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 101,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **202,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 52,121,524** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 5.50 | 735,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 6.47 | 865,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 295 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 197 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 6.52 | 871,725 | **Sufficient Volume** |
| Tank Area (SF) | | 58,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **17,853,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.50 | 8.51 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,276,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 278.00 | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,298,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 64,900 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,409,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 179.67 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 5.50 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 2.75 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,335,524** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 101,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **202,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **44,671,524** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **6 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 179.67 | | 278.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 197.63 | | 305.80 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 97 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **25,763,000** | **$** | **124,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 278.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 179.67 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 197.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 220 | | 105 | |
| Passes | | 7 | | **15.11** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,614,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 186,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **372,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **41,444,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 179.67 | 278.00 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30,000 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 246 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 123 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 2.72 | 363,096 | |
| **Construction Cost (CSOTF)** | **$** | **17,359,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 179.67 | 278.00 | = Peak Rate |
| Force Main Diameter (In) | | 92 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,571,000** | **$ 116,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 278.00 | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 545,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 27,250 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **1,220,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 179.67 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 179.67 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 210 | 100 | |
| Passes | | 7 | **15.11** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,568,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 5.50 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 2.75 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **9,335,524** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 78,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **156,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **66,896,524** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | | |
| **6 Overflows / Year** | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 179.67 | | 278.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,120 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 66 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 33 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP)** | **$** | **32,457,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 197.63 | | 305.80 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | | 97 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **25,763,000** | **$** | **124,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 278.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 52,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 2,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **194,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 179.67 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 197.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 220 | | 105 | |
| Passes | | 7 | | **15.11** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,614,000 | $ | 3,938,000 | |
| **Construction Cost (Disinfection)** | **$** | **6,552,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 105,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **210,000** | | | |
| **TOTAL CAPITAL COST** | | | | **$** | **77,871,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 94 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 735,327 | CF |
| | 5.50 | MG |
| Total Volume | 20,084,095 | CF |
| | 150.23 | MG |
| Peak Rate | 278.00 | CFS |
| | 179.67 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **6 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 179.67 | | 278.00 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **8,731,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 179.67 | | 278.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 92 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **23,571,000** | **$** | **116,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 278.00 | | | Ref: CSO Statistics |
| Diameter (In) | | 108 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **3,541,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 55,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 2,780 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **204,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 179.67 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 210 | | 100 | |
| Passes | | 7 | | **15.11** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,568,000 | $ | 3,658,000 | |
| **Construction Cost (Disinfection)** | **$** | **6,226,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 42,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **84,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **42,772,000** |

**Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 376.49 | $988,434 | 20 | 10.910 | $10,783,750 |
| | Tank O&M | No. Events / Yr | 94 | $143,664 | 50 | 14.484 | $2,080,765 |
| | | Const Cost ($) | $34,364,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 376 | $64,513 | 20 | 10.910 | $703,832 |
| | Odor Control O&M | Capacity (cfm) | 31,960 | $111,860 | 20 | 10.910 | $1,220,386 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $246,436 |
| | | | **Total Annual O&M** | **$1,309,000** | | **Total PW O&M** | **$15,035,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 27.09 | $170,349 | 20 | 10.910 | $1,858,501 |
| | Tank O&M | No. Events / Yr | 94 | $268,601 | 50 | 14.484 | $3,890,309 |
| | | Const Cost ($) | $84,339,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 376 | $64,513 | 20 | 10.910 | $703,832 |
| | Odor Control O&M | Capacity (cfm) | 319,600 | $1,118,600 | 20 | 10.910 | $12,203,858 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $91,612 |
| | | | **Total Annual O&M** | **$1,623,000** | | **Total PW O&M** | **$18,748,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 376.49 | $988,434 | 20 | 10.910 | $10,783,750 |
| | Sed. Basin O&M | Flow Rate (mgd) | 376.49 | $42,355 | 50 | 14.484 | $613,450 |
| | Screening O&M | Flow Rate (mgd) | 376.49 | $64,513 | 20 | 10.910 | $703,832 |
| | Disinfection O&M | Flow Rate (mgd) | 376.49 | $596,257 | 20 | 10.910 | $6,505,125 |
| | Odor Control O&M | Capacity (cfm) | 56,850.00 | $198,975 | 20 | 10.910 | $2,170,805 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $258,464 |
| | | | **Total Annual O&M** | **$1,891,000** | | **Total PW O&M** | **$21,035,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 414.14 | $1,053,421 | 20 | 10.910 | $11,492,758 |
| | HREP O&M | Flow Rate (mgd) | 376.49 | $762,089 | 20 | 10.910 | $8,314,345 |
| | Screening O&M | Flow Rate (mgd) | 376.49 | $64,513 | 20 | 10.910 | $703,832 |
| | Disinfection O&M | Flow Rate (mgd) | 414.14 | $631,902 | 20 | 10.910 | $6,894,012 |
| | Odor Control O&M | Capacity (cfm) | 5,450.00 | $19,075 | 20 | 10.910 | $208,107 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $474,392 |
| | | | **Total Annual O&M** | **$2,531,000** | | **Total PW O&M** | **$28,087,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 414.14 | $1,053,421 | 20 | 10.910 | $11,492,758 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 376.49 | $42,355 | 20 | 10.910 | $462,089 |
| | Screening O&M | Flow Rate (mgd) | 376.49 | $64,513 | 20 | 10.910 | $703,832 |
| | Disinfection O&M | Flow Rate (mgd) | 414.14 | $631,902 | 20 | 10.910 | $6,894,012 |
| | Odor Control O&M | Capacity (cfm) | 57,700.00 | $201,950 | 20 | 10.910 | $2,203,262 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $293,242 |
| | | | **Total Annual O&M** | **$1,995,000** | | **Total PW O&M** | **$22,049,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 376.49 | $988,434 | 20 | 10.910 | $10,783,750 |
| | Screening O&M | Flow Rate (mgd) | 376.49 | $64,513 | 20 | 10.910 | $703,832 |
| | Disinfection O&M | Flow Rate (mgd) | 376.49 | $596,257 | 20 | 10.910 | $6,505,125 |
| | Odor Control O&M | Capacity (cfm) | 5,830.00 | $20,405 | 20 | 10.910 | $222,617 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $253,546 |
| | | | **Total Annual O&M** | **$1,670,000** | | **Total PW O&M** | **$18,469,000** |

**Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 288.28 | $826,971 | 20 | 10.910 | $9,022,204 |
| | Tank O&M | No. Events / Yr | 94 | $79,154 | 50 | 14.484 | $1,146,428 |
| | | Const Cost ($) | $8,560,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 288 | $46,499 | 20 | 10.910 | $507,306 |
| | Odor Control O&M | Capacity (cfm) | 8,940 | $31,290 | 20 | 10.910 | $341,372 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $189,045 |
| | | | **Total Annual O&M** | **$984,000** | | **Total PW O&M** | **$11,206,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 7.57 | $72,662 | 20 | 10.910 | $792,736 |
| | Tank O&M | No. Events / Yr | 94 | $118,301 | 50 | 14.484 | $1,713,425 |
| | | Const Cost ($) | $24,219,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 288 | $46,499 | 20 | 10.910 | $507,306 |
| | Odor Control O&M | Capacity (cfm) | 89,350 | $312,725 | 20 | 10.910 | $3,411,811 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $56,241 |
| | | | **Total Annual O&M** | **$551,000** | | **Total PW O&M** | **$6,482,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 288.28 | $826,971 | 20 | 10.910 | $9,022,204 |
| | Sed. Basin O&M | Flow Rate (mgd) | 288.28 | $32,431 | 50 | 14.484 | $469,724 |
| | Screening O&M | Flow Rate (mgd) | 288.28 | $46,499 | 20 | 10.910 | $507,306 |
| | Disinfection O&M | Flow Rate (mgd) | 288.28 | $506,763 | 20 | 10.910 | $5,528,752 |
| | Odor Control O&M | Capacity (cfm) | 43,650.00 | $152,775 | 20 | 10.910 | $1,666,766 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $200,883 |
| | | | **Total Annual O&M** | **$1,566,000** | | **Total PW O&M** | **$17,396,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 317.11 | $881,343 | 20 | 10.910 | $9,615,395 |
| | HREP O&M | Flow Rate (mgd) | 288.28 | $651,364 | 20 | 10.910 | $7,106,337 |
| | Screening O&M | Flow Rate (mgd) | 288.28 | $46,499 | 20 | 10.910 | $507,306 |
| | Disinfection O&M | Flow Rate (mgd) | 317.11 | $537,058 | 20 | 10.910 | $5,859,270 |
| | Odor Control O&M | Capacity (cfm) | 4,200.00 | $14,700 | 20 | 10.910 | $160,376 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $359,887 |
| | | | **Total Annual O&M** | **$2,131,000** | | **Total PW O&M** | **$23,609,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 317.11 | $881,343 | 20 | 10.910 | $9,615,395 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 288.28 | $32,431 | 20 | 10.910 | $353,825 |
| | Screening O&M | Flow Rate (mgd) | 288.28 | $46,499 | 20 | 10.910 | $507,306 |
| | Disinfection O&M | Flow Rate (mgd) | 317.11 | $537,058 | 20 | 10.910 | $5,859,270 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $210,926 |
| | | | **Total Annual O&M** | **$1,498,000** | | **Total PW O&M** | **$16,547,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 288.28 | $826,971 | 20 | 10.910 | $9,022,204 |
| | Screening O&M | Flow Rate (mgd) | 288.28 | $46,499 | 20 | 10.910 | $507,306 |
| | Disinfection O&M | Flow Rate (mgd) | 288.28 | $506,763 | 20 | 10.910 | $5,528,752 |
| | Odor Control O&M | Capacity (cfm) | 4,460.00 | $15,610 | 20 | 10.910 | $170,304 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $196,884 |
| | | | **Total Annual O&M** | **$1,396,000** | | **Total PW O&M** | **$15,425,000** |

**Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 273.58 | $798,564 | 20 | 10.910 | $8,712,281 |
| | Tank O&M | No. Events / Yr | 94 | $77,799 | 50 | 14.484 | $1,126,803 |
| | | Const Cost ($) | $8,018,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 274 | $43,774 | 20 | 10.910 | $477,577 |
| | Odor Control O&M | Capacity (cfm) | 8,410 | $29,435 | 20 | 10.910 | $321,134 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $179,815 |
| | | | **Total Annual O&M** | **$950,000** | | **Total PW O&M** | **$10,818,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 7.13 | $69,810 | 20 | 10.910 | $761,623 |
| | Tank O&M | No. Events / Yr | 94 | $114,911 | 50 | 14.484 | $1,664,325 |
| | | Const Cost ($) | $22,863,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 274 | $43,774 | 20 | 10.910 | $477,577 |
| | Odor Control O&M | Capacity (cfm) | 84,100 | $294,350 | 20 | 10.910 | $3,211,341 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $53,777 |
| | | | **Total Annual O&M** | **$523,000** | | **Total PW O&M** | **$6,169,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 273.58 | $798,564 | 20 | 10.910 | $8,712,281 |
| | Sed. Basin O&M | Flow Rate (mgd) | 273.58 | $30,778 | 50 | 14.484 | $445,780 |
| | Screening O&M | Flow Rate (mgd) | 273.58 | $43,774 | 20 | 10.910 | $477,577 |
| | Disinfection O&M | Flow Rate (mgd) | 273.58 | $490,865 | 20 | 10.910 | $5,355,311 |
| | Odor Control O&M | Capacity (cfm) | 41,200.00 | $144,200 | 20 | 10.910 | $1,573,213 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $191,242 |
| | | | **Total Annual O&M** | **$1,509,000** | | **Total PW O&M** | **$16,755,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 300.94 | $851,068 | 20 | 10.910 | $9,285,095 |
| | HREP O&M | Flow Rate (mgd) | 273.58 | $631,627 | 20 | 10.910 | $6,891,009 |
| | Screening O&M | Flow Rate (mgd) | 273.58 | $43,774 | 20 | 10.910 | $477,577 |
| | Disinfection O&M | Flow Rate (mgd) | 300.94 | $520,210 | 20 | 10.910 | $5,675,461 |
| | Odor Control O&M | Capacity (cfm) | 4,000.00 | $14,000 | 20 | 10.910 | $152,739 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $341,204 |
| | | | **Total Annual O&M** | **$2,061,000** | | **Total PW O&M** | **$22,823,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 300.94 | $851,068 | 20 | 10.910 | $9,285,095 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 273.58 | $30,778 | 20 | 10.910 | $335,789 |
| | Screening O&M | Flow Rate (mgd) | 273.58 | $43,774 | 20 | 10.910 | $477,577 |
| | Disinfection O&M | Flow Rate (mgd) | 300.94 | $520,210 | 20 | 10.910 | $5,675,461 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $200,754 |
| | | | **Total Annual O&M** | **$1,446,000** | | **Total PW O&M** | **$15,975,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 273.58 | $798,564 | 20 | 10.910 | $8,712,281 |
| | Screening O&M | Flow Rate (mgd) | 273.58 | $43,774 | 20 | 10.910 | $477,577 |
| | Disinfection O&M | Flow Rate (mgd) | 273.58 | $490,865 | 20 | 10.910 | $5,355,311 |
| | Odor Control O&M | Capacity (cfm) | 4,240.00 | $14,840 | 20 | 10.910 | $161,903 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $187,426 |
| | | | **Total Annual O&M** | **$1,349,000** | | **Total PW O&M** | **$14,894,000** |

**Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 197.33 | $641,960 | 20 | 10.910 | $7,003,744 |
| | Tank O&M | No. Events / Yr | 94 | $74,736 | 50 | 14.484 | $1,082,447 |
| | | Const Cost ($) | $6,793,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 197 | $30,900 | 20 | 10.910 | $337,116 |
| | Odor Control O&M | Capacity (cfm) | 7,220 | $25,270 | 20 | 10.910 | $275,694 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $132,108 |
| | | | **Total Annual O&M** | **$773,000** | | **Total PW O&M** | **$8,831,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 6.12 | $63,060 | 20 | 10.910 | $687,978 |
| | Tank O&M | No. Events / Yr | 94 | $107,164 | 50 | 14.484 | $1,552,114 |
| | | Const Cost ($) | $19,764,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 197 | $30,900 | 20 | 10.910 | $337,116 |
| | Odor Control O&M | Capacity (cfm) | 72,150 | $252,525 | 20 | 10.910 | $2,755,032 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $42,728 |
| | | | **Total Annual O&M** | **$454,000** | | **Total PW O&M** | **$5,375,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 197.33 | $641,960 | 20 | 10.910 | $7,003,744 |
| | Sed. Basin O&M | Flow Rate (mgd) | 197.33 | $22,200 | 50 | 14.484 | $321,531 |
| | Screening O&M | Flow Rate (mgd) | 197.33 | $30,900 | 20 | 10.910 | $337,116 |
| | Disinfection O&M | Flow Rate (mgd) | 197.33 | $402,271 | 20 | 10.910 | $4,388,750 |
| | Odor Control O&M | Capacity (cfm) | 29,950.00 | $104,825 | 20 | 10.910 | $1,143,634 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $141,617 |
| | | | **Total Annual O&M** | **$1,203,000** | | **Total PW O&M** | **$13,336,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 217.06 | $684,167 | 20 | 10.910 | $7,464,225 |
| | HREP O&M | Flow Rate (mgd) | 197.33 | $521,207 | 20 | 10.910 | $5,686,342 |
| | Screening O&M | Flow Rate (mgd) | 197.33 | $30,900 | 20 | 10.910 | $337,116 |
| | Disinfection O&M | Flow Rate (mgd) | 217.06 | $426,319 | 20 | 10.910 | $4,651,117 |
| | Odor Control O&M | Capacity (cfm) | 2,900.00 | $10,150 | 20 | 10.910 | $110,736 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $246,025 |
| | | | **Total Annual O&M** | **$1,673,000** | | **Total PW O&M** | **$18,496,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 217.06 | $684,167 | 20 | 10.910 | $7,464,225 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 197.33 | $22,200 | 20 | 10.910 | $242,197 |
| | Screening O&M | Flow Rate (mgd) | 197.33 | $30,900 | 20 | 10.910 | $337,116 |
| | Disinfection O&M | Flow Rate (mgd) | 217.06 | $426,319 | 20 | 10.910 | $4,651,117 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $147,861 |
| | | | **Total Annual O&M** | **$1,164,000** | | **Total PW O&M** | **$12,843,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 197.33 | $641,960 | 20 | 10.910 | $7,003,744 |
| | Screening O&M | Flow Rate (mgd) | 197.33 | $30,900 | 20 | 10.910 | $337,116 |
| | Disinfection O&M | Flow Rate (mgd) | 197.33 | $402,271 | 20 | 10.910 | $4,388,750 |
| | Odor Control O&M | Capacity (cfm) | 3,060.00 | $10,710 | 20 | 10.910 | $116,845 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $138,641 |
| | | | **Total Annual O&M** | **$1,086,000** | | **Total PW O&M** | **$11,985,000** |

**Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 179.67 | $602,970 | 20 | 10.910 | $6,578,365 |
| | Tank O&M | No. Events / Yr | 94 | $72,869 | 50 | 14.484 | $1,055,399 |
| | | Const Cost ($) | $6,046,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 180 | $28,220 | 20 | 10.910 | $307,879 |
| | Odor Control O&M | Capacity (cfm) | 6,490 | $22,715 | 20 | 10.910 | $247,819 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $120,995 |
| | | | **Total Annual O&M** | **$727,000** | | **Total PW O&M** | **$8,310,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 5.50 | $58,713 | 20 | 10.910 | $640,560 |
| | Tank O&M | No. Events / Yr | 94 | $102,386 | 50 | 14.484 | $1,482,918 |
| | | Const Cost ($) | $17,853,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 180 | $28,220 | 20 | 10.910 | $307,879 |
| | Odor Control O&M | Capacity (cfm) | 64,900 | $227,150 | 20 | 10.910 | $2,478,193 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $39,587 |
| | | | **Total Annual O&M** | **$417,000** | | **Total PW O&M** | **$4,949,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 179.67 | $602,970 | 20 | 10.910 | $6,578,365 |
| | Sed. Basin O&M | Flow Rate (mgd) | 179.67 | $20,212 | 50 | 14.484 | $292,747 |
| | Screening O&M | Flow Rate (mgd) | 179.67 | $28,220 | 20 | 10.910 | $307,879 |
| | Disinfection O&M | Flow Rate (mgd) | 179.67 | $379,931 | 20 | 10.910 | $4,145,029 |
| | Odor Control O&M | Capacity (cfm) | 27,250.00 | $95,375 | 20 | 10.910 | $1,040,535 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $130,221 |
| | | | **Total Annual O&M** | **$1,127,000** | | **Total PW O&M** | **$12,495,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 197.63 | $642,614 | 20 | 10.910 | $7,010,878 |
| | HREP O&M | Flow Rate (mgd) | 179.67 | $493,238 | 20 | 10.910 | $5,381,200 |
| | Screening O&M | Flow Rate (mgd) | 179.67 | $28,220 | 20 | 10.910 | $307,879 |
| | Disinfection O&M | Flow Rate (mgd) | 197.63 | $402,644 | 20 | 10.910 | $4,392,826 |
| | Odor Control O&M | Capacity (cfm) | 2,600.00 | $9,100 | 20 | 10.910 | $99,280 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $224,782 |
| | | | **Total Annual O&M** | **$1,576,000** | | **Total PW O&M** | **$17,417,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 197.63 | $642,614 | 20 | 10.910 | $7,010,878 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 179.67 | $20,212 | 20 | 10.910 | $220,515 |
| | Screening O&M | Flow Rate (mgd) | 179.67 | $28,220 | 20 | 10.910 | $307,879 |
| | Disinfection O&M | Flow Rate (mgd) | 197.63 | $402,644 | 20 | 10.910 | $4,392,826 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $135,971 |
| | | | **Total Annual O&M** | **$1,094,000** | | **Total PW O&M** | **$12,068,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 179.67 | $602,970 | 20 | 10.910 | $6,578,365 |
| | Screening O&M | Flow Rate (mgd) | 179.67 | $28,220 | 20 | 10.910 | $307,879 |
| | Disinfection O&M | Flow Rate (mgd) | 179.67 | $379,931 | 20 | 10.910 | $4,145,029 |
| | Odor Control O&M | Capacity (cfm) | 2,780.00 | $9,730 | 20 | 10.910 | $106,154 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $127,458 |
| | | | **Total Annual O&M** | **$1,021,000** | | **Total PW O&M** | **$11,265,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $114.6 | $114,550,000 | $0 |
| 1 | $114.6 | $114,550,000 | $0 |
| 2 | $114.6 | $114,550,000 | $0 |
| 4 | $114.6 | $114,550,000 | $0 |
| 6 | $114.6 | $114,550,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $153.6 | $134,862,044 | $18,748,000 |
| 1 | $64.1 | $57,590,745 | $6,482,000 |
| 2 | $61.4 | $55,233,780 | $6,169,000 |
| 4 | $53.2 | $47,863,266 | $5,375,000 |
| 6 | $49.6 | $44,671,524 | $4,949,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $135.5 | $120,450,044 | $15,035,000 |
| 1 | $84.8 | $73,592,745 | $11,206,000 |
| 2 | $81.3 | $70,432,780 | $10,818,000 |
| 4 | $64.9 | $56,045,266 | $8,831,000 |
| 6 | $60.4 | $52,121,524 | $8,310,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $114.2 | $92,200,000 | $22,049,000 |
| 1 | $78.5 | $61,981,000 | $16,547,000 |
| 2 | $75.2 | $59,192,000 | $15,975,000 |
| 4 | $57.5 | $44,674,000 | $12,843,000 |
| 6 | $53.5 | $41,444,000 | $12,068,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $188.0 | $159,929,000 | $28,087,000 |
| 1 | $145.8 | $122,202,000 | $23,609,000 |
| 2 | $138.9 | $116,076,000 | $22,823,000 |
| 4 | $103.3 | $84,812,000 | $18,496,000 |
| 6 | $95.3 | $77,871,000 | $17,417,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $127.5 | $106,458,232 | $21,035,000 |
| 1 | $106.2 | $88,781,745 | $17,396,000 |
| 2 | $102.4 | $85,658,780 | $16,755,000 |
| 4 | $83.8 | $70,427,266 | $13,336,000 |
| 6 | $79.4 | $66,896,524 | $12,495,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $98.7 | $80,199,000 | $18,469,000 |
| 1 | $78.8 | $63,393,000 | $15,425,000 |
| 2 | $75.5 | $60,607,000 | $14,894,000 |
| 4 | $58.1 | $46,098,000 | $11,985,000 |
| 6 | $54.0 | $42,772,000 | $11,265,000 |

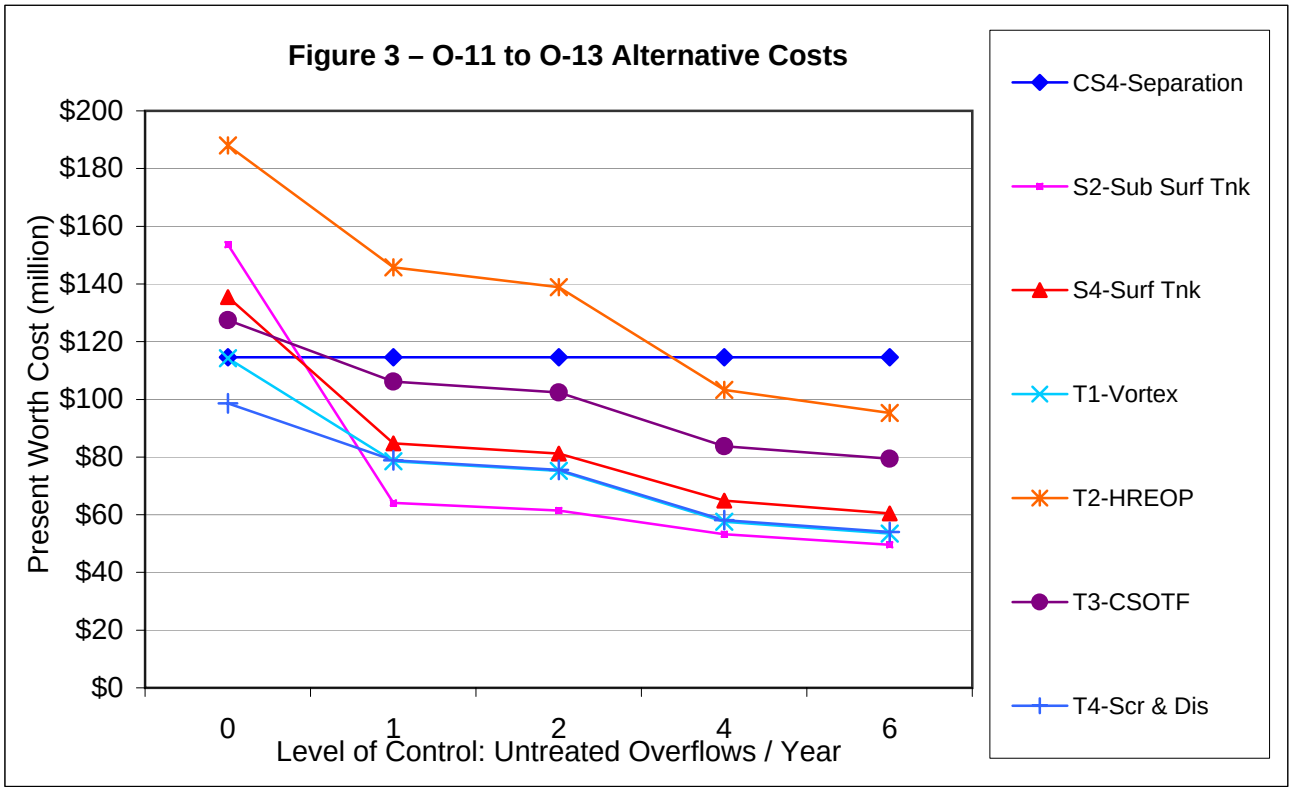


Figure 3 – O-11 to O-13 Alternative Costs
Present Worth Cost (million)
$200
$180
$160
$140
$120
$100
$80
$60
$40
$20
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Region Name** | O-11 to O-13 |
| **Structures within Region** | O-11 and O-13 |
| **Model ID** | O-11 to O-13.1 |
| **Structure Type** | Consolidation |
| **PWSA Sewershed** | N/A |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | N/A |
| **Owner** | N/A |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 94 | |
| Peak Volume: | 3,621,560 | $ft^3$ |
| | 27.09 | MG |
| Total Volume: | 20,084,095 | $ft^3$ |
| | 150.24 | MG |
| Peak Rate: | 582.55 | cfs |

**Model Network** (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2

**Model Run** 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 0:18 | 3342 | 1/5/2005 14:45 | 3621559.82 | 27091.078 | 0 | 80.15 | 21 |
| 1/11/2005 7:31 | 1697 | 1/12/2005 1:30 | 1011662.13 | 7567.739 | 1 | 68.06 | 27 |
| 10/24/2005 12:46 | 1817 | 10/25/2005 2:15 | 952815.55 | 7127.537 | 2 | 45.57 | 34 |
| 11/14/2005 21:30 | 590 | 11/15/2005 3:45 | 867131.70 | 6486.579 | 3 | 156.28 | 9 |
| 7/5/2005 16:00 | 139 | 7/5/2005 16:30 | 818279.99 | 6121.143 | 4 | 582.55 | 0 |
| 2/14/2005 4:16 | 1226 | 2/14/2005 10:00 | 812649.85 | 6079.027 | 5 | 25.73 | 49 |
| 11/29/2005 1:45 | 754 | 11/29/2005 7:00 | 735326.92 | 5500.613 | 6 | 74.01 | 25 |
| 6/11/2005 17:30 | 60 | 6/11/2005 18:00 | 722068.29 | 5401.432 | 7 | 446.07 | 1 |
| 8/20/2005 18:00 | 114 | 8/20/2005 19:00 | 684227.27 | 5118.362 | 8 | 344.58 | 3 |
| 1/3/2005 3:21 | 1295 | 1/3/2005 13:50 | 628909.85 | 4704.560 | 9 | 35.94 | 42 |
| 5/13/2005 22:30 | 690 | 5/13/2005 23:45 | 605289.72 | 4527.870 | 10 | 125.49 | 13 |
| 7/12/2005 18:45 | 125 | 7/12/2005 20:00 | 580380.94 | 4341.540 | 11 | 292.35 | 5 |
| 4/1/2005 19:15 | 1182 | 4/2/2005 6:30 | 515648.64 | 3857.310 | 12 | 62.54 | 30 |
| 4/23/2005 3:15 | 550 | 4/23/2005 3:45 | 426627.15 | 3191.384 | 13 | 138.81 | 12 |
| 3/28/2005 7:55 | 789 | 3/28/2005 10:15 | 423733.52 | 3169.739 | 14 | 35.53 | 44 |
| 7/15/2005 17:30 | 90 | 7/15/2005 18:00 | 421556.21 | 3153.451 | 15 | 187.20 | 8 |
| 5/14/2005 16:00 | 410 | 5/14/2005 16:15 | 409718.20 | 3064.897 | 16 | 423.33 | 2 |
| 9/29/2005 5:00 | 124 | 9/29/2005 5:45 | 389448.53 | 2913.270 | 17 | 305.34 | 4 |
| 1/13/2005 22:35 | 304 | 1/14/2005 2:05 | 331511.98 | 2479.875 | 18 | 38.49 | 37 |
| 7/26/2005 19:30 | 65 | 7/26/2005 20:00 | 323891.69 | 2422.872 | 19 | 265.39 | 7 |
| 8/29/2005 9:15 | 394 | 8/29/2005 13:00 | 315332.99 | 2358.848 | 20 | 115.20 | 16 |
| 1/8/2005 1:00 | 597 | 1/8/2005 5:15 | 309967.92 | 2318.715 | 21 | 75.94 | 22 |
| 3/23/2005 2:30 | 715 | 3/23/2005 12:30 | 268331.80 | 2007.256 | 22 | 36.98 | 40 |
| 5/11/2005 22:30 | 120 | 5/11/2005 22:45 | 263511.63 | 1971.199 | 23 | 98.63 | 19 |
| 5/28/2005 8:15 | 634 | 5/28/2005 9:15 | 261878.73 | 1958.984 | 24 | 65.46 | 29 |
| 12/15/2005 10:45 | 589 | 12/15/2005 14:00 | 245677.37 | 1837.790 | 25 | 90.04 | 20 |
| 5/23/2005 16:15 | 50 | 5/23/2005 16:30 | 227198.26 | 1699.557 | 26 | 278.00 | 6 |
| 10/21/2005 18:33 | 221 | 10/21/2005 19:10 | 178710.13 | 1336.841 | 27 | 36.40 | 41 |
| 11/9/2005 19:15 | 50 | 11/9/2005 19:30 | 168955.50 | 1263.872 | 28 | 140.84 | 10 |
| 7/17/2005 16:00 | 60 | 7/17/2005 16:15 | 165280.85 | 1236.383 | 29 | 122.07 | 14 |
| 2/9/2005 14:50 | 145 | 2/9/2005 16:45 | 164574.93 | 1231.103 | 30 | 74.30 | 24 |
| 2/20/2005 15:25 | 699 | 2/20/2005 20:00 | 161779.88 | 1210.194 | 31 | 67.71 | 28 |
| 10/7/2005 7:05 | 390 | 10/7/2005 10:45 | 161239.62 | 1206.153 | 32 | 44.76 | 35 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 7/21/2005 14:15 | 55 | 7/21/2005 14:45 | 143466.50 | 1073.201 | 33 | 140.06 | 11 |
| 10/22/2005 6:55 | 694 | 10/22/2005 16:45 | 140076.29 | 1047.841 | 34 | 30.54 | 45 |
| 4/22/2005 15:45 | 329 | 4/22/2005 16:15 | 138766.23 | 1038.041 | 35 | 43.24 | 36 |
| 4/20/2005 18:30 | 349 | 4/20/2005 21:30 | 127592.07 | 954.452 | 36 | 37.31 | 39 |
| 5/20/2005 3:00 | 529 | 5/20/2005 6:30 | 126385.94 | 945.430 | 37 | 29.99 | 46 |
| 9/26/2005 6:45 | 317 | 9/26/2005 8:00 | 124365.10 | 930.313 | 38 | 68.58 | 26 |
| 7/25/2005 13:00 | 55 | 7/25/2005 13:30 | 122353.52 | 915.265 | 39 | 121.84 | 15 |
| 11/1/2005 14:31 | 218 | 11/1/2005 16:30 | 107641.57 | 805.213 | 40 | 24.80 | 50 |
| 4/30/2005 4:16 | 169 | 4/30/2005 6:45 | 99211.02 | 742.148 | 41 | 26.04 | 48 |
| 3/24/2005 9:30 | 40 | 3/24/2005 9:45 | 76610.38 | 573.084 | 42 | 99.70 | 18 |
| 6/14/2005 18:45 | 75 | 6/14/2005 19:30 | 74193.95 | 555.008 | 43 | 35.56 | 43 |
| 11/16/2005 4:00 | 454 | 11/16/2005 4:15 | 61324.98 | 458.742 | 44 | 61.23 | 31 |
| 6/28/2005 18:00 | 70 | 6/28/2005 18:15 | 60197.07 | 450.304 | 45 | 75.61 | 23 |
| 8/27/2005 15:04 | 50 | 8/27/2005 15:30 | 59353.74 | 443.996 | 46 | 101.09 | 17 |
| 2/16/2005 7:00 | 99 | 2/16/2005 7:20 | 59167.84 | 442.605 | 47 | 21.43 | 53 |
| 11/9/2005 4:00 | 95 | 11/9/2005 4:30 | 53745.84 | 402.046 | 48 | 48.41 | 32 |
| 8/26/2005 20:45 | 55 | 8/26/2005 21:00 | 52567.66 | 393.232 | 49 | 46.39 | 33 |
| 12/25/2005 10:40 | 169 | 12/25/2005 13:00 | 48200.35 | 360.563 | 50 | 22.46 | 52 |
| 3/27/2005 16:45 | 93 | 3/27/2005 17:15 | 41972.09 | 313.972 | 51 | 22.90 | 51 |
| 6/3/2005 7:47 | 108 | 6/3/2005 9:15 | 25596.26 | 191.473 | 52 | 27.81 | 47 |
| 5/7/2005 12:01 | 108 | 5/7/2005 13:30 | 24387.36 | 182.430 | 53 | 38.20 | 38 |
| 3/20/2005 3:31 | 303 | 3/20/2005 7:25 | 23458.03 | 175.478 | 54 | 18.29 | 55 |
| 6/10/2005 21:15 | 40 | 6/10/2005 21:35 | 17257.30 | 129.093 | 55 | 19.43 | 54 |
| 4/3/2005 1:00 | 421 | 4/3/2005 4:45 | 16764.83 | 125.409 | 56 | 8.21 | 57 |
| 3/7/2005 22:10 | 368 | 3/8/2005 1:45 | 14140.43 | 105.778 | 57 | 4.00 | 63 |
| 8/8/2005 8:32 | 57 | 8/8/2005 9:05 | 11734.48 | 87.780 | 58 | 15.45 | 56 |
| 4/27/2005 0:15 | 105 | 4/27/2005 0:40 | 10272.61 | 76.844 | 59 | 7.44 | 58 |
| 12/31/2005 23:00 | 60 | 12/31/2005 23:05 | 8201.28 | 61.350 | 60 | 2.39 | 67 |
| 1/30/2005 1:16 | 654 | 1/30/2005 11:40 | 7774.45 | 58.157 | 61 | 4.00 | 64 |
| 11/6/2005 13:45 | 35 | 11/6/2005 14:10 | 4362.30 | 32.632 | 62 | 5.82 | 60 |
| 11/23/2005 19:25 | 64 | 11/23/2005 20:20 | 3942.78 | 29.494 | 63 | 6.63 | 59 |
| 8/16/2005 5:02 | 122 | 8/16/2005 6:40 | 2341.50 | 17.516 | 64 | 1.97 | 68 |
| 10/21/2005 7:18 | 42 | 10/21/2005 7:45 | 2250.43 | 16.834 | 65 | 3.06 | 65 |
| 11/24/2005 7:55 | 234 | 11/24/2005 8:15 | 2090.53 | 15.638 | 66 | 1.17 | 73 |
| 7/17/2005 8:45 | 20 | 7/17/2005 9:00 | 2085.56 | 15.601 | 67 | 5.18 | 61 |
| 9/16/2005 8:45 | 34 | 9/16/2005 9:00 | 2073.83 | 15.513 | 68 | 4.27 | 62 |
| 10/24/2005 1:42 | 112 | 10/24/2005 3:25 | 1726.26 | 12.913 | 69 | 1.61 | 70 |
| 5/24/2005 21:05 | 30 | 5/24/2005 21:15 | 1655.18 | 12.382 | 70 | 1.53 | 71 |
| 7/13/2005 15:45 | 20 | 7/13/2005 16:00 | 1633.10 | 12.216 | 71 | 2.61 | 66 |
| 2/25/2005 13:05 | 44 | 2/25/2005 13:15 | 1072.56 | 8.023 | 72 | 0.74 | 74 |
| 7/27/2005 3:16 | 18 | 7/27/2005 3:30 | 918.11 | 6.868 | 73 | 1.87 | 69 |
| 6/17/2005 1:25 | 69 | 6/17/2005 1:30 | 797.33 | 5.964 | 74 | 1.42 | 72 |
| 3/11/2005 13:30 | 34 | 3/11/2005 14:00 | 553.58 | 4.141 | 75 | 0.33 | 82 |
| 8/5/2005 11:05 | 29 | 8/5/2005 11:25 | 549.90 | 4.114 | 76 | 0.50 | 77 |
| 10/26/2005 8:41 | 113 | 10/26/2005 10:30 | 517.42 | 3.871 | 77 | 0.59 | 76 |
| 2/8/2005 5:45 | 94 | 2/8/2005 7:15 | 516.68 | 3.865 | 78 | 0.35 | 80 |
| 6/16/2005 11:16 | 333 | 6/16/2005 16:45 | 476.67 | 3.566 | 79 | 0.62 | 75 |
| 1/26/2005 7:50 | 74 | 1/26/2005 9:00 | 426.99 | 3.194 | 80 | 0.32 | 83 |
| 3/12/2005 11:30 | 19 | 3/12/2005 11:45 | 319.31 | 2.389 | 81 | 0.36 | 78 |
| 1/22/2005 10:16 | 63 | 1/22/2005 10:30 | 317.27 | 2.373 | 82 | 0.26 | 85 |
| 2/24/2005 19:00 | 19 | 2/24/2005 19:15 | 301.64 | 2.256 | 83 | 0.35 | 79 |
| 12/26/2005 6:00 | 19 | 12/26/2005 6:15 | 301.14 | 2.253 | 84 | 0.34 | 81 |
| 2/26/2005 13:03 | 61 | 2/26/2005 14:00 | 198.00 | 1.481 | 85 | 0.13 | 91 |
| 5/19/2005 19:30 | 19 | 5/19/2005 19:45 | 188.28 | 1.408 | 86 | 0.21 | 88 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 12/4/2005 6:30 | 18 | 12/4/2005 6:45 | 175.10 | 1.310 | 87 | 0.20 | 89 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 4/24/2005 23:46 | 18 | 4/25/2005 0:00 | 172.51 | 1.290 | 88 | 0.22 | 86 |
| 9/23/2005 2:30 | 18 | 9/23/2005 2:45 | 172.43 | 1.290 | 89 | 0.19 | 90 |
| 4/25/2005 6:06 | 13 | 4/25/2005 6:15 | 129.87 | 0.971 | 90 | 0.30 | 84 |
| 4/24/2005 4:06 | 13 | 4/24/2005 4:15 | 103.54 | 0.775 | 91 | 0.22 | 87 |
| 5/27/2005 20:32 | 14 | 5/27/2005 20:40 | 43.27 | 0.324 | 92 | 0.05 | 92 |
| 4/24/2005 14:53 | 9 | 4/24/2005 15:00 | 25.06 | 0.187 | 93 | 0.05 | 93 |

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

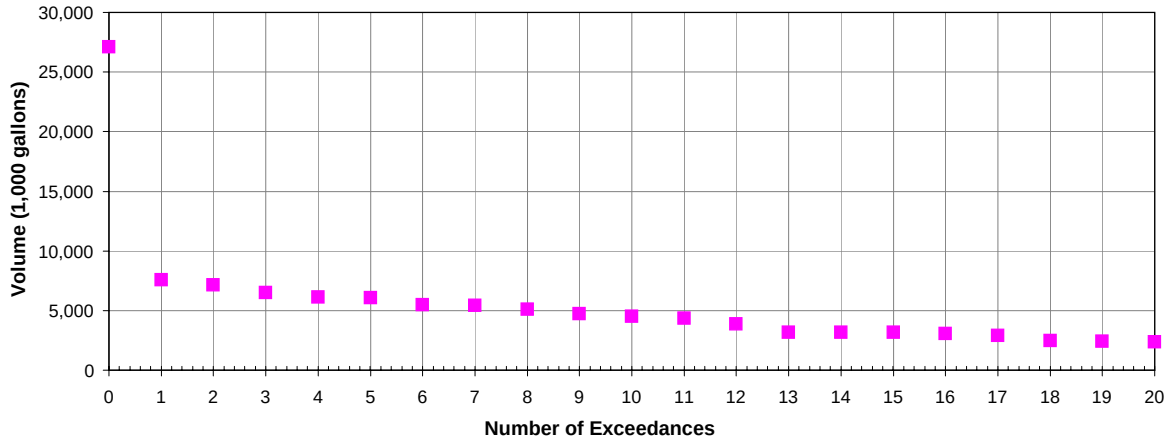
| | |
|---|---|
| **Region Name** | O-11 to O-13 |
| **Structures within Region** | O-11 and O-13 |
| **Model ID** | O-11 to O-13.1 |
| **Structure Type** | Consolidation |
| **PWSA Sewershed** | N/A |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | N/A |
| **Owner** | N/A |

**Results Summary**

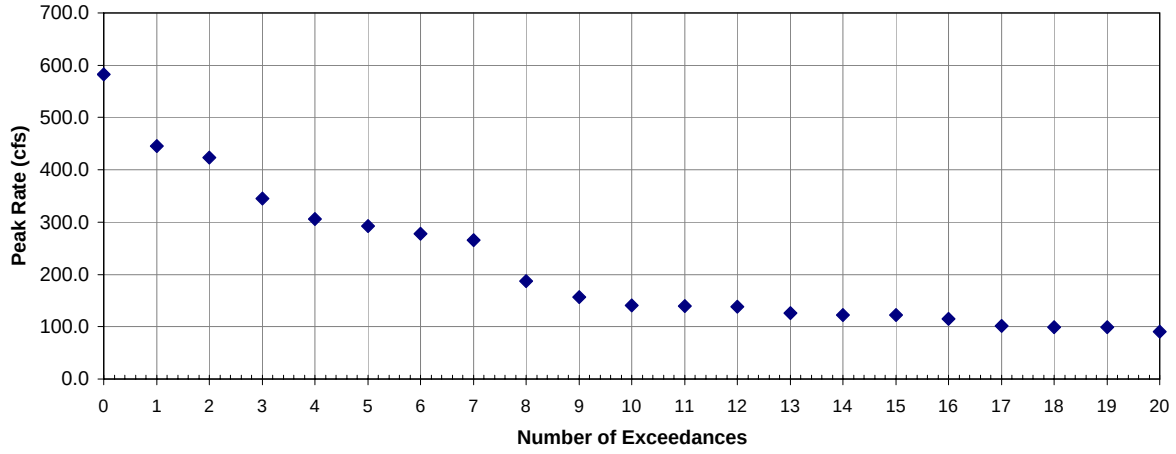
| | | |
|---|---|---|
| Number of Events: | 94 | |
| Peak Volume: | 3,621,560 | $ft^3$ |
| | 27.09 | MG |
| Total Volume: | 20,084,095 | $ft^3$ |
| | 150.24 | MG |
| Peak Rate: | 582.55 | cfs |

| | |
|---|---|
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection |

### Figure 1 - O-11 to O-13 CSO Volume




### Figure 2 - O-11 to O-13 CSO Peak Flow Rate



## D.25.4 O-11 AND O-13 – GLEN MAWR SEWERSHEDS – NPDES# 021KO11 AND 021RO13

### Description of Outfalls

The Glen Mawr Sewersheds consist of approximately 806 acres of combined sewers that contribute flow to fifteen (15) ALCOSAN outfalls. The outfalls 021KO11 and 021RO13 have been grouped into a consolidation of outfalls. The O-11 tributary area consists of 52 acres of residential, business and commercial users, and the O-13 tributary area consists of 713 acres of similar usage. The Glen Mawr Avenue Sewersheds are comprised of approximately 540 manholes and 135,718 linear feet (25.7 miles) of mostly combined sewer up to 120 inches in diameter. The outfalls currently convey overflows from each of the respective ALCOSAN diversion chambers to the Ohio River.

*Attachment 1, Tributary Area Map,* shows the CSO locations and the tributary areas.

Outfalls 021KO11 and 021RO13 typically experience 94 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 27.09 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from the outfalls is approximately 582.55 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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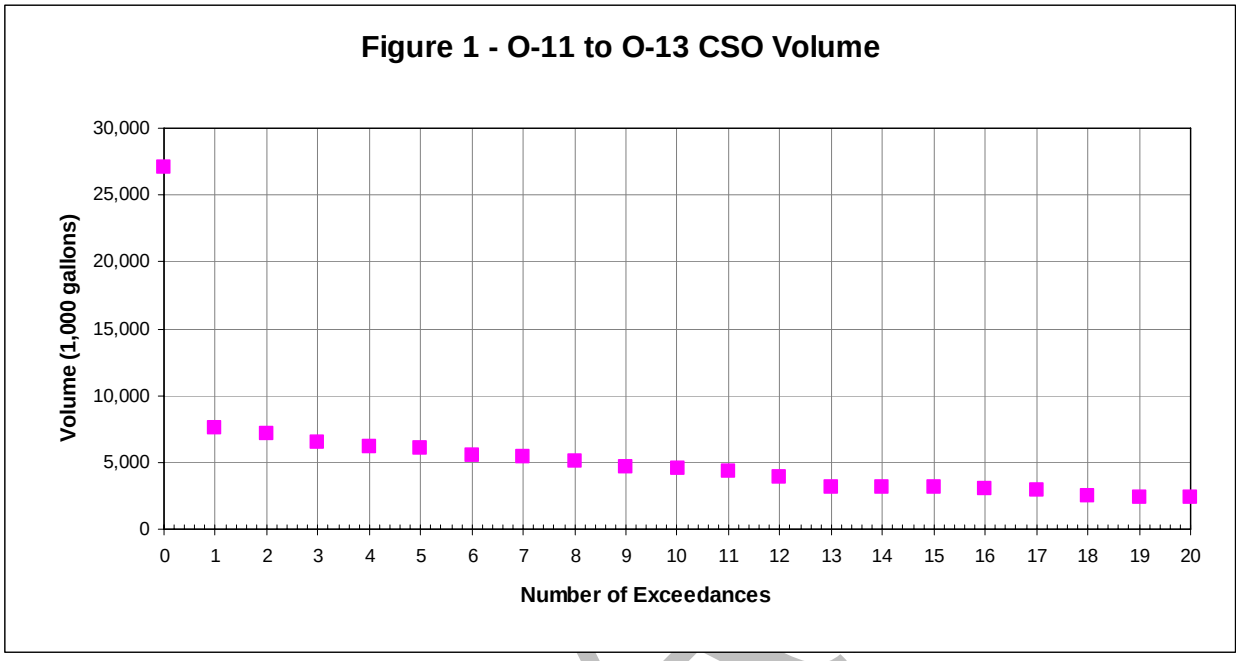


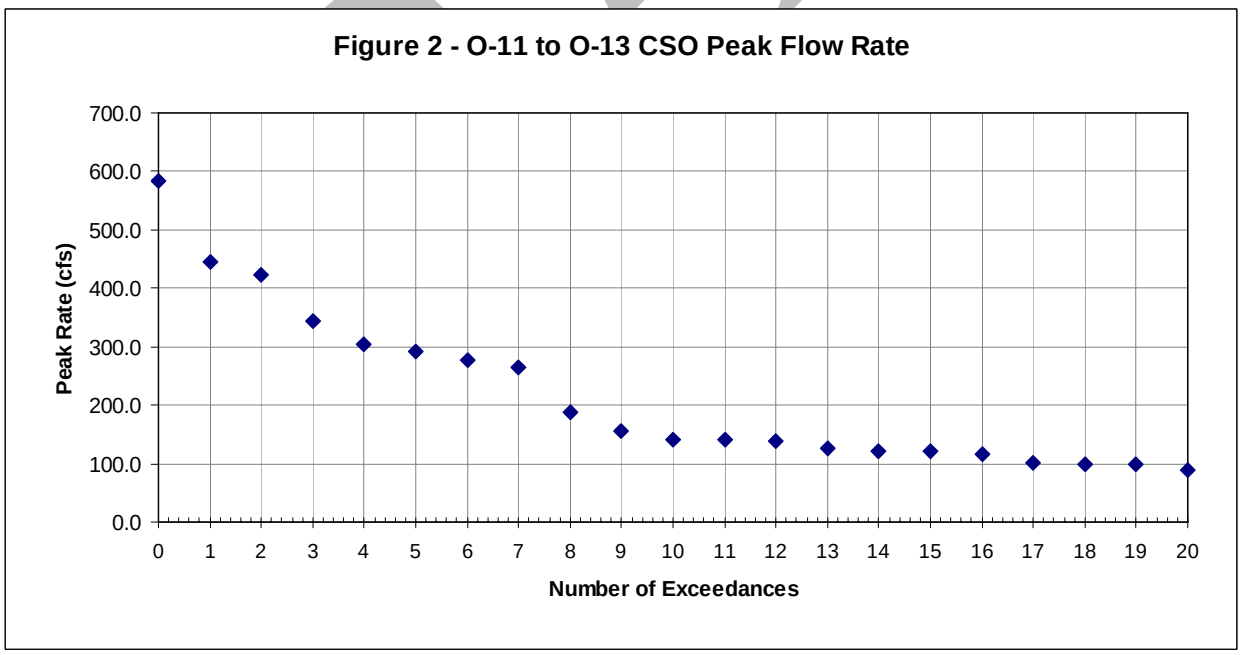


A necessary component of all storage and treatment alternatives would be the construction of a consolidation sewer. The sewer is required to convey CSOs from outfall 021KO11 to the

vicinity of outfall 021RO13. There appears to be a very limited amount of available space for potential storage or treatment facilities along Carson Street. A significant amount of private property will need to be procured to construct a storage or treatment facility in this consolidation. The site is generally bounded by the Ohio River to the east, railroad tracks and Carson Street to the east and existing private development, residences, and steep slopes to the west.

**Description of Consolidated Outfall Alternatives**

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail. The following paragraphs describe these CSO control alternatives in more detail.

***Collection System Alternatives***

CS4- O-11 AND O-13: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

***Storage Alternatives***

S2- O-11 AND O-13: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-

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surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4- O-11 AND O-13: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1- O-11 AND O-13: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2- O-11 AND O-13: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3- O-11 AND O-13: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

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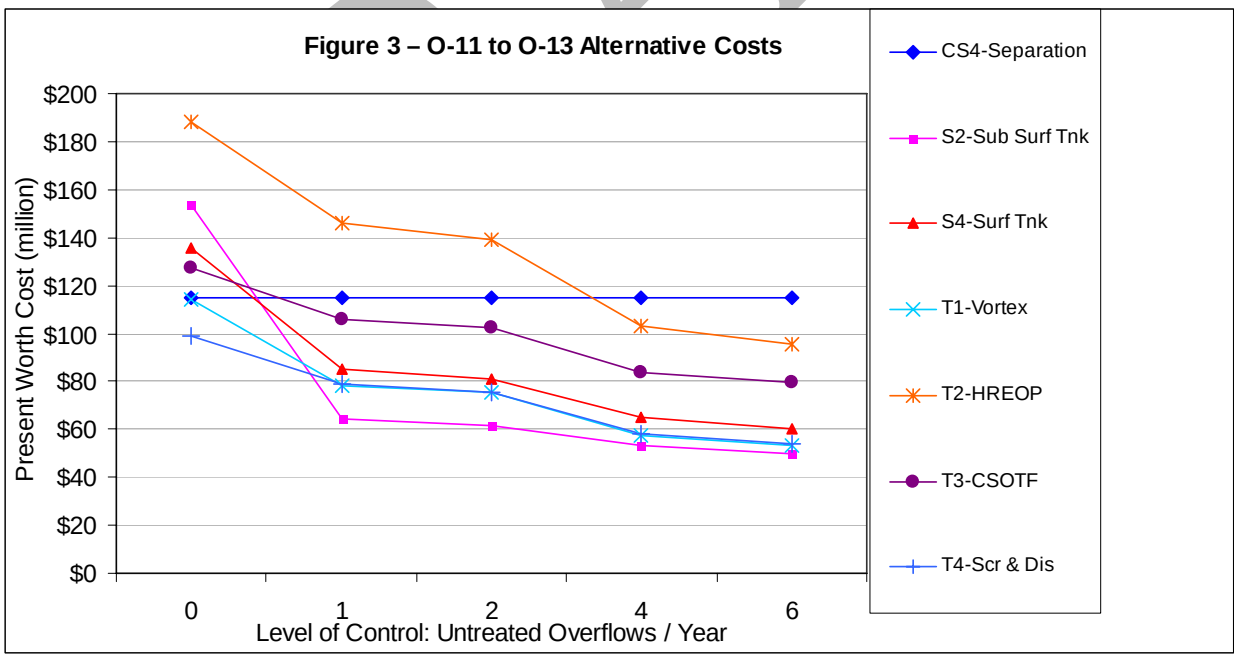
T4- O-11 AND O-13: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – O-11 and O-13 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.





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The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control level 0, it is recommended that Alternative CS4- O-11 and O-13: Sewer Separation be carried forward and re-evaluated with the results of the system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2- O-11 and O-13: Sub-Surface Storage be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

A site large enough for a sub-surface storage facility for all control levels does not appear to be easily accessible or available. A significant amount of property acquirement and site preparation work will be required in order to construct a storage facility in this area.

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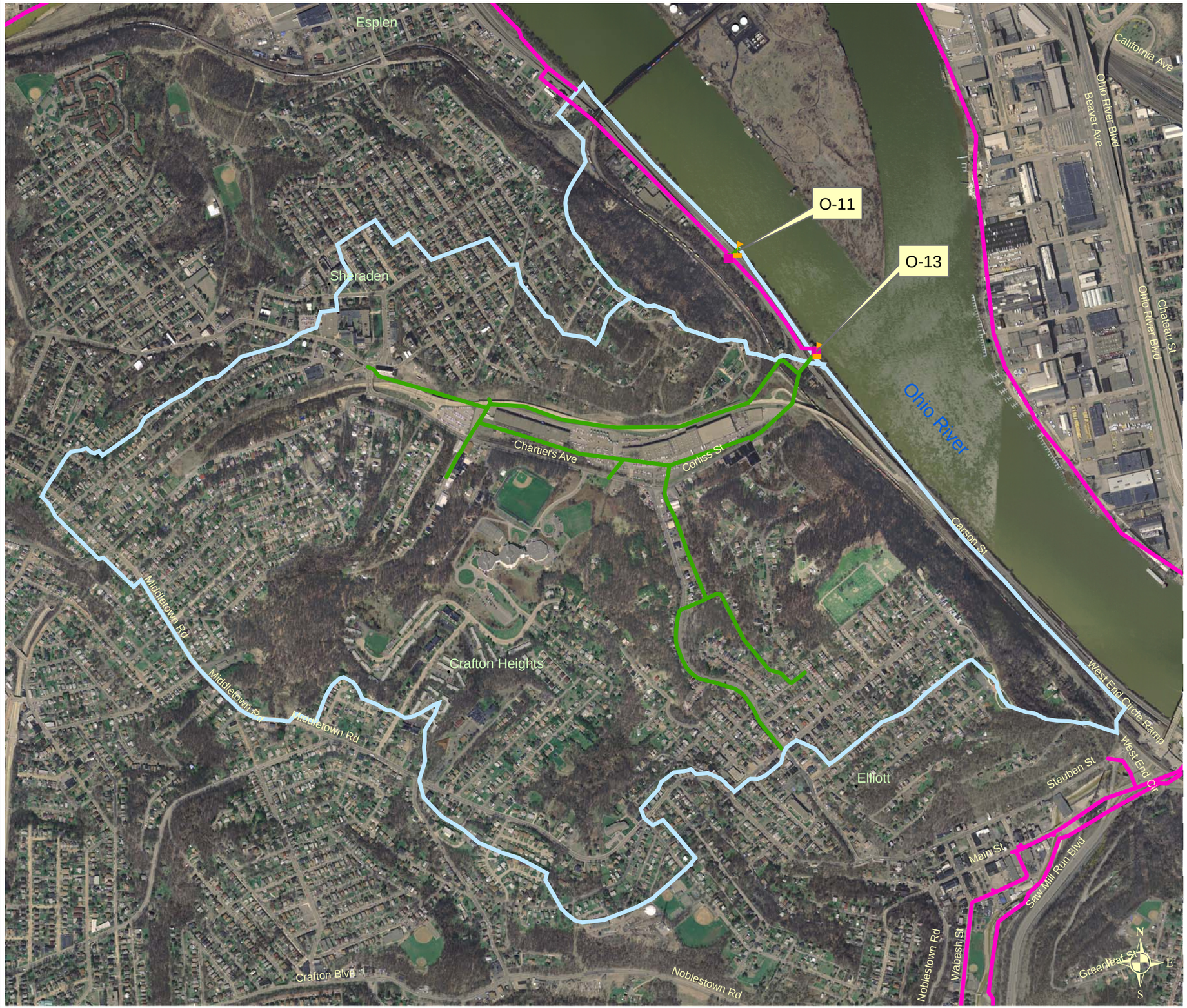


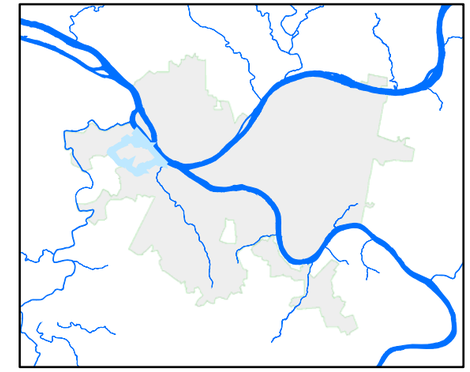

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000 Feet

# Attachment 1
# O-11 to O-13
# Tributary Area Map
# Glen Mawr Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

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Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will not be evaluated. |
| Sewer separation | Y | Sewer separation will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with all storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with all treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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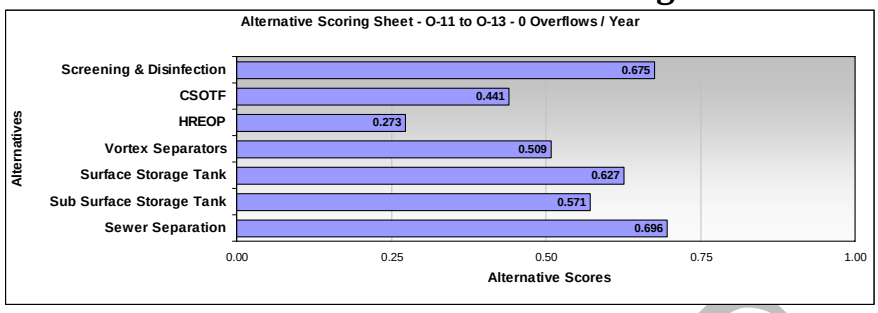
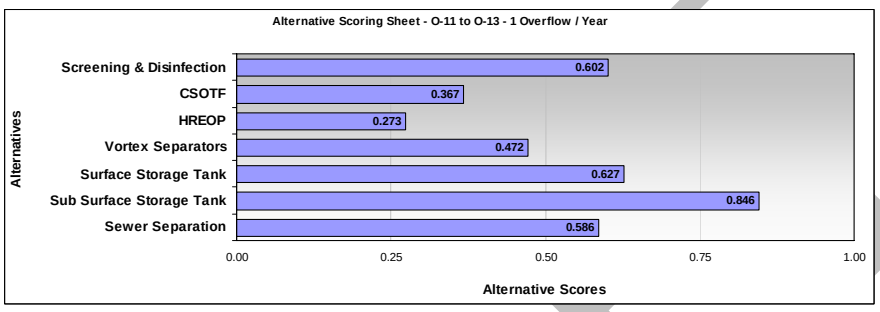
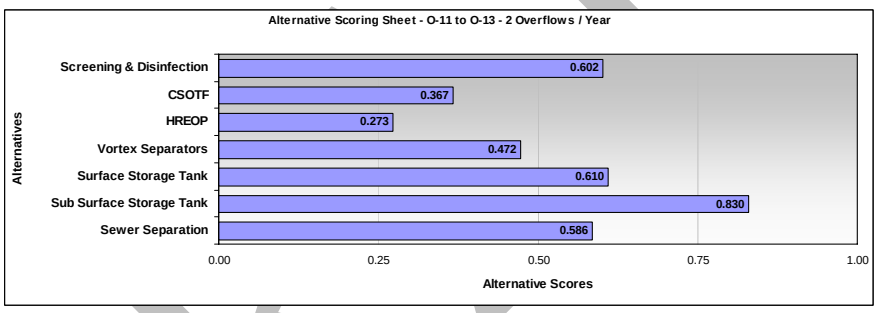
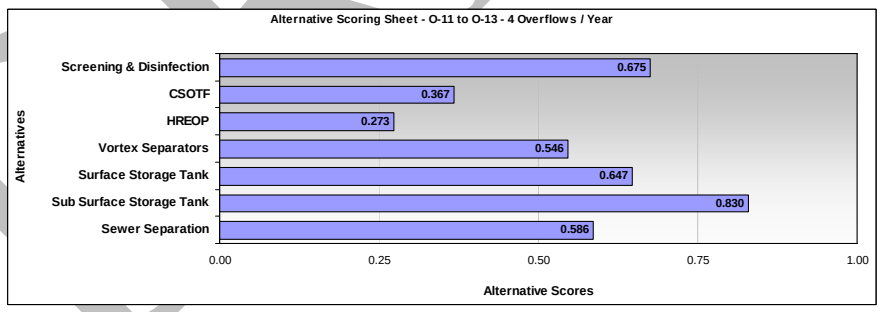
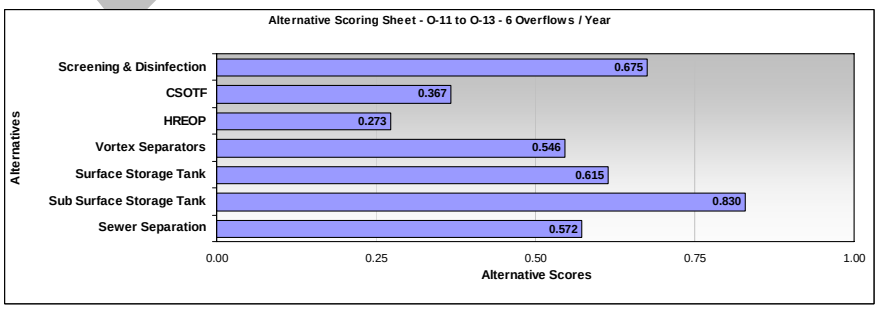
# Attachment 3 – Alternative Scoring Sheet

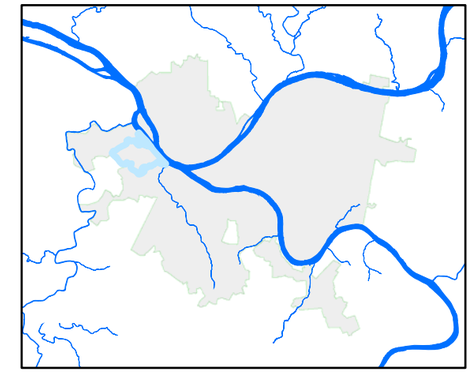




Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 290 580 Feet

# Attachment 4
# O-11 to O-13
# Facilities Boundary Map
# Glen Mawr
# Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0204.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 2 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 4 | 4 | 4 | #N/A |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.600** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.620** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.584** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

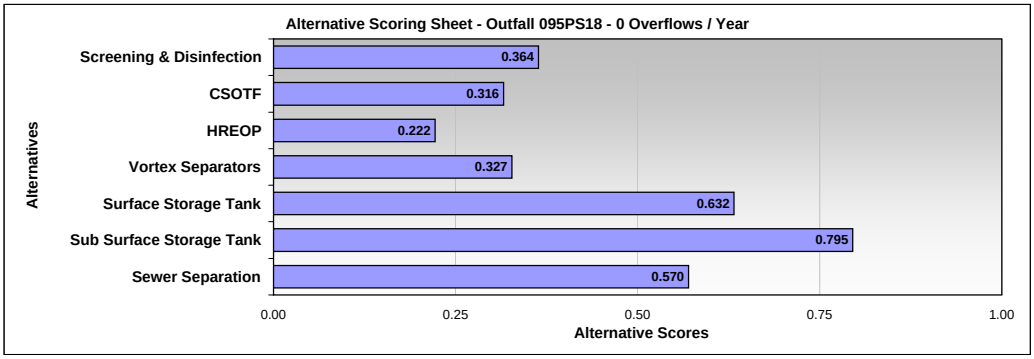
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

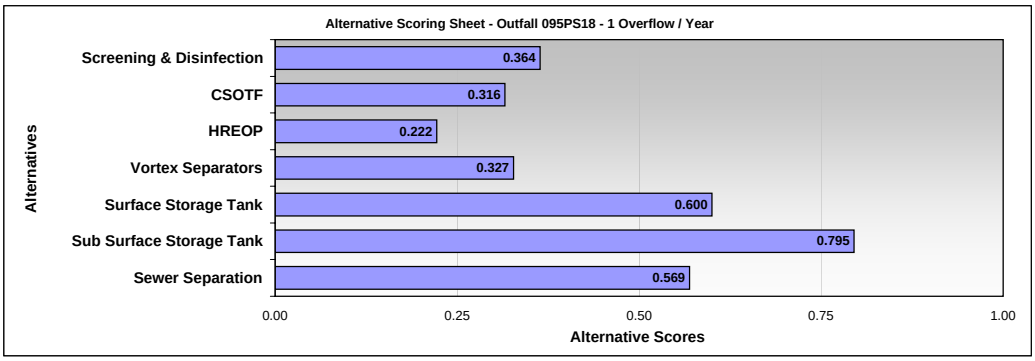
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

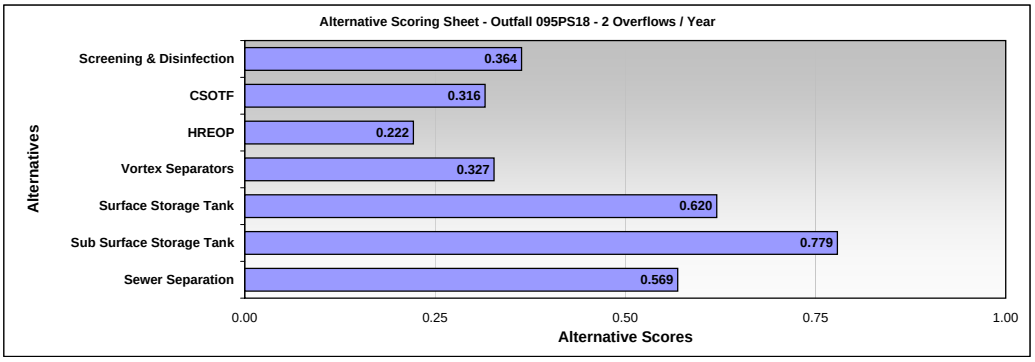
Total Score

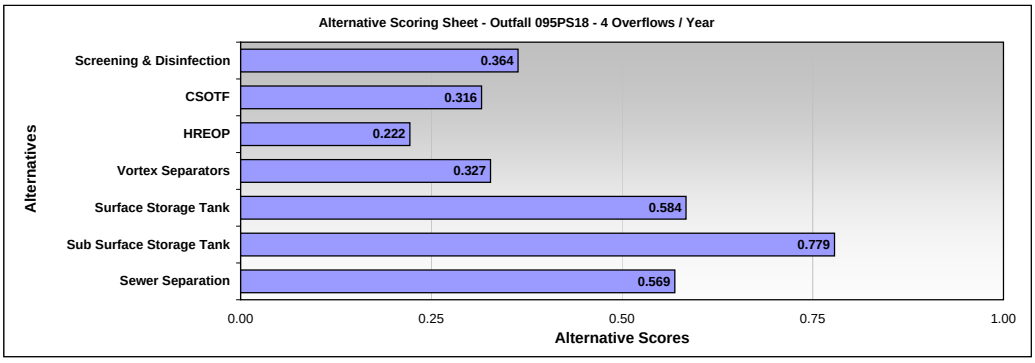
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

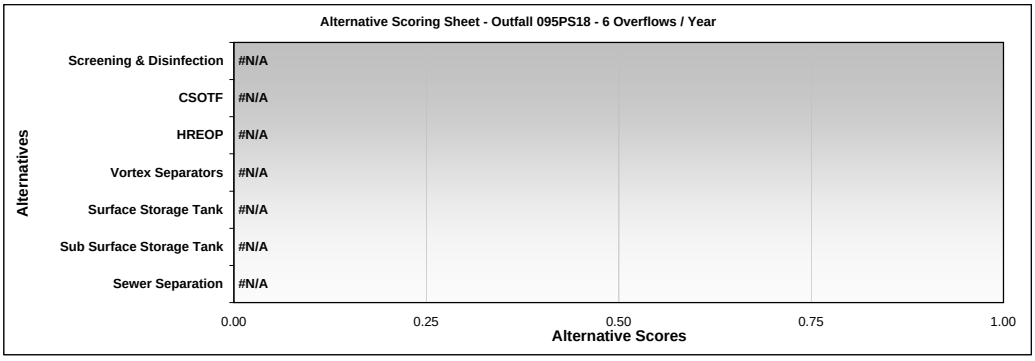
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |


Alternative Scoring Sheet - Outfall 095PS18 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.632
0.795
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 095PS18 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.600
0.795
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 095PS18 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.620
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 095PS18 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.584
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 095PS18 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 235 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **35,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 102,366 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **205,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 35,494,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **29,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 4.85 | | 7.50 | = Peak Rate |
| Force Main Diameter (In) | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 2,181,000** | | **$ 24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.50 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 50 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$ 9,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 4.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 637,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 40,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **3,022,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,041,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 11.7 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 319,000** | | **$ 12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.50 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 49,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 4.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 637,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 40,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **2,200,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.85 | | 7.50 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **792,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.33 | | 8.25 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,252,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.50 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **637,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | | 18 | |
| Passes / Detention (Min) | | 3 | | **16.14** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **450,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,650,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 4.85 | | 7.50 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 900 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 43 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 22 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.08 | | 11,352 | |
| **Construction Cost (CSOTF) $** | **16,390,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 4.85 | | 7.50 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,181,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.50 | | | Ref: CSO Statistics |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 17,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **81,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 4.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **637,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 4.85 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 35 | | 17 | |
| Passes / Detention (Min) | 3 | | **15.86** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **440,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 7,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **14,000** | | | |
| | | **TOTAL CAPITAL COST $** | | **19,869,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.85 | | 7.50 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 60 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 12 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,960,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.33 | | 8.25 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,252,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.50 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **637,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 37 | | 18 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **16.14** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 450,000 | $ | 306,000 | |
| **Construction Cost (Disinfection)** | **$** | **756,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,795,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 5,499 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 7.50 | CFS |
| | 4.85 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.85 | | 7.50 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **637,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.85 | | 7.50 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,181,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.50 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.85 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 17 | |
| Passes / Detention (Min) | | 3 | | **15.86** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 440,000 | $ | 291,000 | |
| **Construction Cost (Disinfection)** | **$** | **731,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,734,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 235 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **35,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 102,366 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **205,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 35,494,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **29,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 3.83 | | 5.93 | = Peak Rate |
| Force Main Diameter (In) | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,022,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.93 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 50 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **9,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 3.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **590,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,814,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,039,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 11.5 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **319,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.93 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **49,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **590,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,151,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.83 | | 5.93 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.21 | | 6.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,083,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.93 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **590,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes | | 3 | | **16.20** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **427,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,493,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 3.83 | | 5.93 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 700 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 38 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 19 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.06 | | 8,664 | |
| **Construction Cost (CSOTF) $** | **16,392,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 3.83 | | 5.93 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,022,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.93 | | | Ref: CSO Statistics |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 13,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 650 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **65,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **590,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 3.83 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 31 | | 15 | |
| Passes | 3 | | **15.69** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **419,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 7,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **14,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **19,626,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.83 | | 5.93 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,800,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.21 | | 6.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,083,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.93 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **590,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | Input by Engineer |
| Passes | | 3 | | **16.20** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 427,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **702,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,363,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 5,430 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 5.93 | CFS |
| | 3.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.83 | | 5.93 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **590,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.83 | | 5.93 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,022,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.93 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 60 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.83 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 31 | | 15 | |
| Passes | | 3 | | **15.69** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 419,000 | $ | 260,000 | |
| **Construction Cost (Disinfection)** | **$** | **679,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,471,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 235 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **35,250,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 102,366 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **205,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **35,494,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **27,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.83 | | 4.38 | = Peak Rate |
| Force Main Diameter (In) | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,856,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.38 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 50 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **9,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **543,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,598,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 5,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 6,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 25 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 17 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.05 | | 6,375 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,033,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 11.0 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **317,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.38 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 9,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **49,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **543,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,096,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.83 | | 4.38 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.11 | | 4.82 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,904,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.38 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **543,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 28 | | 14 | |
| Passes | | 3 | | **16.27** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **403,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,239,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.83 | 4.38 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.83 | 4.38 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,856,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.38 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.83 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **543,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.83 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | 13 | |
| Passes | | 3 | **16.03** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **397,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,378,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.83 | | 4.38 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,644,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.11 | | 4.82 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,904,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.38 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **543,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 28 | | 14 | Input by Engineer |
| Passes | | 3 | | **16.27** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 403,000 | $ | 241,000 | |
| **Construction Cost (Disinfection)** | **$** | **644,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,913,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 5,165 | CF |
| | 0.04 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 4.38 | CFS |
| | 2.83 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.83 | | 4.38 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **543,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.83 | | 4.38 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,856,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.38 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.83 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | |
| Passes | | 3 | | **16.03** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 397,000 | $ | 232,000 | |
| **Construction Cost (Disinfection)** | **$** | **629,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,206,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 235 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **35,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 102,366 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **205,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **35,494,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **9,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.57 | | 3.97 | = Peak Rate |
| Force Main Diameter (In) | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,810,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.97 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 20 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **4,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **531,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,514,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **957,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.01 | | 0.02 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **296,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.97 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **21,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **531,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,957,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.57 | | 3.97 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.82 | | 4.37 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,855,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.97 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **531,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | |
| Passes | | 3 | | **16.06** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **397,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,172,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.57 | | 3.97 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.57 | | 3.97 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,810,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.97 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **531,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.57 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 12 | |
| Passes | | 3 | | **15.70** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **392,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **19,314,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.57 | | 3.97 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,603,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.82 | | 4.37 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,855,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.97 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **531,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | Input by Engineer |
| Passes | | 3 | | **16.06** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 397,000 | $ | 232,000 | |
| **Construction Cost (Disinfection)** | **$** | **629,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,796,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 6 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,863 | CF |
| | 0.01 | MG |
| Total Volume | 20,230 | CF |
| | 0.15 | MG |
| Peak Rate | 3.97 | CFS |
| | 2.57 | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.57 | | 3.97 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **531,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.57 | | 3.97 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,810,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.97 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.57 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 12 | |
| Passes | | 3 | | **15.70** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 392,000 | $ | 222,000 | |
| **Construction Cost (Disinfection)** | **$** | **614,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,130,000** |

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| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 235 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **35,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 102,366 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **205,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **35,494,000** |

Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | #N/A | #N/A | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | #N/A | #N/A | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | #N/A | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | #N/A | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | #N/A | #N/A | **#N/A** |
| Tank Area (SF) | | #N/A | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **#N/A** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Rate |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | #N/A | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | #N/A | #N/A | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | #N/A | #N/A | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | #N/A | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | #N/A | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | #N/A | #N/A | **#N/A** |
| Tank Area (SF) | | #N/A | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | #N/A | | Input by Engineer |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | #N/A | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | #N/A | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | #N/A | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | #N/A | **#N/A** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | #N/A | **#N/A** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **#N/A** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | #N/A | #N/A | |
| **Construction Cost (CSOTF)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: CSO Statistics |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | #N/A | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | |
| 6 Overflows / Year | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | #N/A | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | #N/A | **#N/A** | Input by Engineer |
| Width (Ft) | | #N/A | **#N/A** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **#N/A** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Input by Engineer |
| **Construction Cost (HREOP)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | #N/A | | Input by Engineer |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Input by Engineer |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Input by Engineer |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | Input by Engineer |
| Passes | | #N/A | **#N/A** | Input by Engineer / 12' SWD Basis |
| | | | **#N/A** | |
| Construction Cost (Disinfection / CC Tank) | #N/A | | #N/A | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | | #N/A | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 6 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 20,230 | CF |
| | | 0.15 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 095PS18 / Sewershed ACSO 095PS18 | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow, into facility (MGD) | | #N/A | #N/A | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: CSO Statistics |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow (MGD) | | #N/A | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| Construction Cost (Disinfection / CC Tank) | #N/A | | #N/A | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **6. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | | #N/A | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.85 | $53,965 | 20 | 10.910 | $588,759 |
| | Tank O&M | No. Events / Yr | 6 | $3,759 | 50 | 14.484 | $54,442 |
| | | Const Cost ($) | $29,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,842 | 20 | 10.910 | $85,552 |
| | Odor Control O&M | Capacity (cfm) | 50 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,656 |
| | | | **Total Annual O&M** | **$66,000** | | **Total PW O&M** | **$741,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,230 | 20 | 10.910 | $24,325 |
| | Tank O&M | No. Events / Yr | 6 | $6,289 | 50 | 14.484 | $91,086 |
| | | Const Cost ($) | $1,041,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,842 | 20 | 10.910 | $85,552 |
| | Odor Control O&M | Capacity (cfm) | 450 | $1,575 | 20 | 10.910 | $17,183 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,167 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$221,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.85 | $53,965 | 20 | 10.910 | $588,759 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.85 | $545 | 50 | 14.484 | $7,899 |
| | Screening O&M | Flow Rate (mgd) | 4.85 | $7,842 | 20 | 10.910 | $85,552 |
| | Disinfection O&M | Flow Rate (mgd) | 4.85 | $42,066 | 20 | 10.910 | $458,939 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,048 |
| | | | **Total Annual O&M** | **$108,000** | | **Total PW O&M** | **$1,186,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.33 | $57,513 | 20 | 10.910 | $627,468 |
| | HREP O&M | Flow Rate (mgd) | 4.85 | $58,937 | 20 | 10.910 | $642,999 |
| | Screening O&M | Flow Rate (mgd) | 4.85 | $7,842 | 20 | 10.910 | $85,552 |
| | Disinfection O&M | Flow Rate (mgd) | 5.33 | $44,581 | 20 | 10.910 | $486,375 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,517 |
| | | | **Total Annual O&M** | **$170,000** | | **Total PW O&M** | **$1,864,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.33 | $57,513 | 20 | 10.910 | $627,468 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.85 | $545 | 20 | 10.910 | $5,950 |
| | Screening O&M | Flow Rate (mgd) | 4.85 | $7,842 | 20 | 10.910 | $85,552 |
| | Disinfection O&M | Flow Rate (mgd) | 5.33 | $44,581 | 20 | 10.910 | $486,375 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,554 |
| | | | **Total Annual O&M** | **$116,000** | | **Total PW O&M** | **$1,274,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.85 | $53,965 | 20 | 10.910 | $588,759 |
| | Screening O&M | Flow Rate (mgd) | 4.85 | $7,842 | 20 | 10.910 | $85,552 |
| | Disinfection O&M | Flow Rate (mgd) | 4.85 | $42,066 | 20 | 10.910 | $458,939 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,863 |
| | | | **Total Annual O&M** | **$105,000** | | **Total PW O&M** | **$1,148,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.83 | $46,098 | 20 | 10.910 | $502,930 |
| | Tank O&M | No. Events / Yr | 6 | $3,759 | 50 | 14.484 | $54,442 |
| | | Const Cost ($) | $29,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,756 | 20 | 10.910 | $84,613 |
| | Odor Control O&M | Capacity (cfm) | 50 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,879 |
| | | | **Total Annual O&M** | **$58,000** | | **Total PW O&M** | **$654,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,211 | 20 | 10.910 | $24,119 |
| | Tank O&M | No. Events / Yr | 6 | $6,284 | 50 | 14.484 | $91,013 |
| | | Const Cost ($) | $1,039,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,756 | 20 | 10.910 | $84,613 |
| | Odor Control O&M | Capacity (cfm) | 450 | $1,575 | 20 | 10.910 | $17,183 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,040 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$220,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.83 | $46,098 | 20 | 10.910 | $502,930 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.83 | $431 | 50 | 14.484 | $6,240 |
| | Screening O&M | Flow Rate (mgd) | 3.83 | $7,756 | 20 | 10.910 | $84,613 |
| | Disinfection O&M | Flow Rate (mgd) | 3.83 | $36,436 | 20 | 10.910 | $397,519 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,171 |
| | | | **Total Annual O&M** | **$93,000** | | **Total PW O&M** | **$1,027,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.21 | $49,129 | 20 | 10.910 | $535,997 |
| | HREP O&M | Flow Rate (mgd) | 3.83 | $51,304 | 20 | 10.910 | $559,725 |
| | Screening O&M | Flow Rate (mgd) | 3.83 | $7,756 | 20 | 10.910 | $84,613 |
| | Disinfection O&M | Flow Rate (mgd) | 4.21 | $38,615 | 20 | 10.910 | $421,284 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,202 |
| | | | **Total Annual O&M** | **$148,000** | | **Total PW O&M** | **$1,622,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.21 | $49,129 | 20 | 10.910 | $535,997 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.83 | $431 | 20 | 10.910 | $4,700 |
| | Screening O&M | Flow Rate (mgd) | 3.83 | $7,756 | 20 | 10.910 | $84,613 |
| | Disinfection O&M | Flow Rate (mgd) | 4.21 | $38,615 | 20 | 10.910 | $421,284 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,265 |
| | | | **Total Annual O&M** | **$96,000** | | **Total PW O&M** | **$1,058,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.83 | $46,098 | 20 | 10.910 | $502,930 |
| | Screening O&M | Flow Rate (mgd) | 3.83 | $7,756 | 20 | 10.910 | $84,613 |
| | Disinfection O&M | Flow Rate (mgd) | 3.83 | $36,436 | 20 | 10.910 | $397,519 |
| | Odor Control O&M | Capacity (cfm) | 60.00 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,021 |
| | | | **Total Annual O&M** | **$91,000** | | **Total PW O&M** | **$998,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.83 | $37,667 | 20 | 10.910 | $410,940 |
| | Tank O&M | No. Events / Yr | 6 | $3,754 | 50 | 14.484 | $54,370 |
| | | Const Cost ($) | $27,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,672 | 20 | 10.910 | $83,696 |
| | Odor Control O&M | Capacity (cfm) | 50 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,074 |
| | | | **Total Annual O&M** | **$50,000** | | **Total PW O&M** | **$560,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,138 | 20 | 10.910 | $23,329 |
| | Tank O&M | No. Events / Yr | 6 | $6,269 | 50 | 14.484 | $90,796 |
| | | Const Cost ($) | $1,033,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,672 | 20 | 10.910 | $83,696 |
| | Odor Control O&M | Capacity (cfm) | 450 | $1,575 | 20 | 10.910 | $17,183 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,904 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$218,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.83 | $37,667 | 20 | 10.910 | $410,940 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.83 | $318 | 50 | 14.484 | $4,612 |
| | Screening O&M | Flow Rate (mgd) | 2.83 | $7,672 | 20 | 10.910 | $83,696 |
| | Disinfection O&M | Flow Rate (mgd) | 2.83 | $30,307 | 20 | 10.910 | $330,646 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,273 |
| | | | **Total Annual O&M** | **$78,000** | | **Total PW O&M** | **$859,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.11 | $40,143 | 20 | 10.910 | $437,959 |
| | HREP O&M | Flow Rate (mgd) | 2.83 | $42,947 | 20 | 10.910 | $468,544 |
| | Screening O&M | Flow Rate (mgd) | 2.83 | $7,672 | 20 | 10.910 | $83,696 |
| | Disinfection O&M | Flow Rate (mgd) | 3.11 | $32,119 | 20 | 10.910 | $350,413 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,838 |
| | | | **Total Annual O&M** | **$124,000** | | **Total PW O&M** | **$1,357,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.11 | $40,143 | 20 | 10.910 | $437,959 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.83 | $318 | 20 | 10.910 | $3,474 |
| | Screening O&M | Flow Rate (mgd) | 2.83 | $7,672 | 20 | 10.910 | $83,696 |
| | Disinfection O&M | Flow Rate (mgd) | 3.11 | $32,119 | 20 | 10.910 | $350,413 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,341 |
| | | | **Total Annual O&M** | **$81,000** | | **Total PW O&M** | **$886,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.83 | $37,667 | 20 | 10.910 | $410,940 |
| | Screening O&M | Flow Rate (mgd) | 2.83 | $7,672 | 20 | 10.910 | $83,696 |
| | Disinfection O&M | Flow Rate (mgd) | 2.83 | $30,307 | 20 | 10.910 | $330,646 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,154 |
| | | | **Total Annual O&M** | **$76,000** | | **Total PW O&M** | **$837,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.57 | $35,298 | 20 | 10.910 | $385,101 |
| | Tank O&M | No. Events / Yr | 6 | $3,709 | 50 | 14.484 | $53,718 |
| | | Const Cost ($) | $9,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,650 | 20 | 10.910 | $83,457 |
| | Odor Control O&M | Capacity (cfm) | 20 | $70 | 20 | 10.910 | $764 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,840 |
| | | | **Total Annual O&M** | **$47,000** | | **Total PW O&M** | **$532,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.01 | $1,082 | 20 | 10.910 | $11,802 |
| | Tank O&M | No. Events / Yr | 6 | $6,079 | 50 | 14.484 | $88,044 |
| | | Const Cost ($) | $957,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,650 | 20 | 10.910 | $83,457 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,709 |
| | | | **Total Annual O&M** | **$16,000** | | **Total PW O&M** | **$192,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.57 | $35,298 | 20 | 10.910 | $385,101 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.57 | $289 | 50 | 14.484 | $4,185 |
| | Screening O&M | Flow Rate (mgd) | 2.57 | $7,650 | 20 | 10.910 | $83,457 |
| | Disinfection O&M | Flow Rate (mgd) | 2.57 | $28,564 | 20 | 10.910 | $311,635 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,040 |
| | | | **Total Annual O&M** | **$74,000** | | **Total PW O&M** | **$814,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.82 | $37,619 | 20 | 10.910 | $410,421 |
| | HREP O&M | Flow Rate (mgd) | 2.57 | $40,560 | 20 | 10.910 | $442,511 |
| | Screening O&M | Flow Rate (mgd) | 2.57 | $7,650 | 20 | 10.910 | $83,457 |
| | Disinfection O&M | Flow Rate (mgd) | 2.82 | $30,272 | 20 | 10.910 | $330,265 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,477 |
| | | | **Total Annual O&M** | **$117,000** | | **Total PW O&M** | **$1,283,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.82 | $37,619 | 20 | 10.910 | $410,421 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.57 | $289 | 20 | 10.910 | $3,152 |
| | Screening O&M | Flow Rate (mgd) | 2.57 | $7,650 | 20 | 10.910 | $83,457 |
| | Disinfection O&M | Flow Rate (mgd) | 2.82 | $30,272 | 20 | 10.910 | $330,265 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,093 |
| | | | **Total Annual O&M** | **$76,000** | | **Total PW O&M** | **$837,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.57 | $35,298 | 20 | 10.910 | $385,101 |
| | Screening O&M | Flow Rate (mgd) | 2.57 | $7,650 | 20 | 10.910 | $83,457 |
| | Disinfection O&M | Flow Rate (mgd) | 2.57 | $28,564 | 20 | 10.910 | $311,635 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,914 |
| | | | **Total Annual O&M** | **$72,000** | | **Total PW O&M** | **$792,000** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Tank O&M | No. Events / Yr | 6 | #N/A | 50 | 14.484 | #N/A |
| | | Const Cost ($) | #N/A | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Tank O&M | No. Events / Yr | 6 | #N/A | 50 | 14.484 | #N/A |
| | | Const Cost ($) | #N/A | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Sed. Basin O&M | Flow Rate (mgd) | #N/A | #N/A | 50 | 14.484 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | HREP O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Swirl / Vortex O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 095PS18 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $35.5 | $35,494,000 | $0 |
| 1 | $35.5 | $35,494,000 | $0 |
| 2 | $35.5 | $35,494,000 | $0 |
| 4 | $35.5 | $35,494,000 | $0 |
| 6 | $35.5 | $35,494,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.4 | $2,200,000 | $221,000 |
| 1 | $2.4 | $2,151,000 | $220,000 |
| 2 | $2.3 | $2,096,000 | $218,000 |
| 4 | $2.1 | $1,957,000 | $192,000 |
| 6 | #N/A | #N/A | #N/A |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.8 | $3,022,000 | $741,000 |
| 1 | $3.5 | $2,814,000 | $654,000 |
| 2 | $3.2 | $2,598,000 | $560,000 |
| 4 | $3.0 | $2,514,000 | $532,000 |
| 6 | #N/A | #N/A | #N/A |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.9 | $4,650,000 | $1,274,000 |
| 1 | $4.6 | $3,493,000 | $1,058,000 |
| 2 | $4.1 | $3,239,000 | $886,000 |
| 4 | $4.0 | $3,172,000 | $837,000 |
| 6 | #N/A | #N/A | #N/A |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.7 | $5,795,000 | $1,864,000 |
| 1 | $7.0 | $5,363,000 | $1,622,000 |
| 2 | $6.3 | $4,913,000 | $1,357,000 |
| 4 | $6.1 | $4,796,000 | $1,283,000 |
| 6 | #N/A | #N/A | #N/A |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $21.1 | $19,869,000 | $1,186,000 |
| 1 | $20.7 | $19,626,000 | $1,027,000 |
| 2 | $20.2 | $19,378,000 | $859,000 |
| 4 | $20.1 | $19,314,000 | $814,000 |
| 6 | #N/A | #N/A | #N/A |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.9 | $3,734,000 | $1,148,000 |
| 1 | $4.5 | $3,471,000 | $998,000 |
| 2 | $4.0 | $3,206,000 | $837,000 |
| 4 | $3.9 | $3,130,000 | $792,000 |
| 6 | #N/A | #N/A | #N/A |

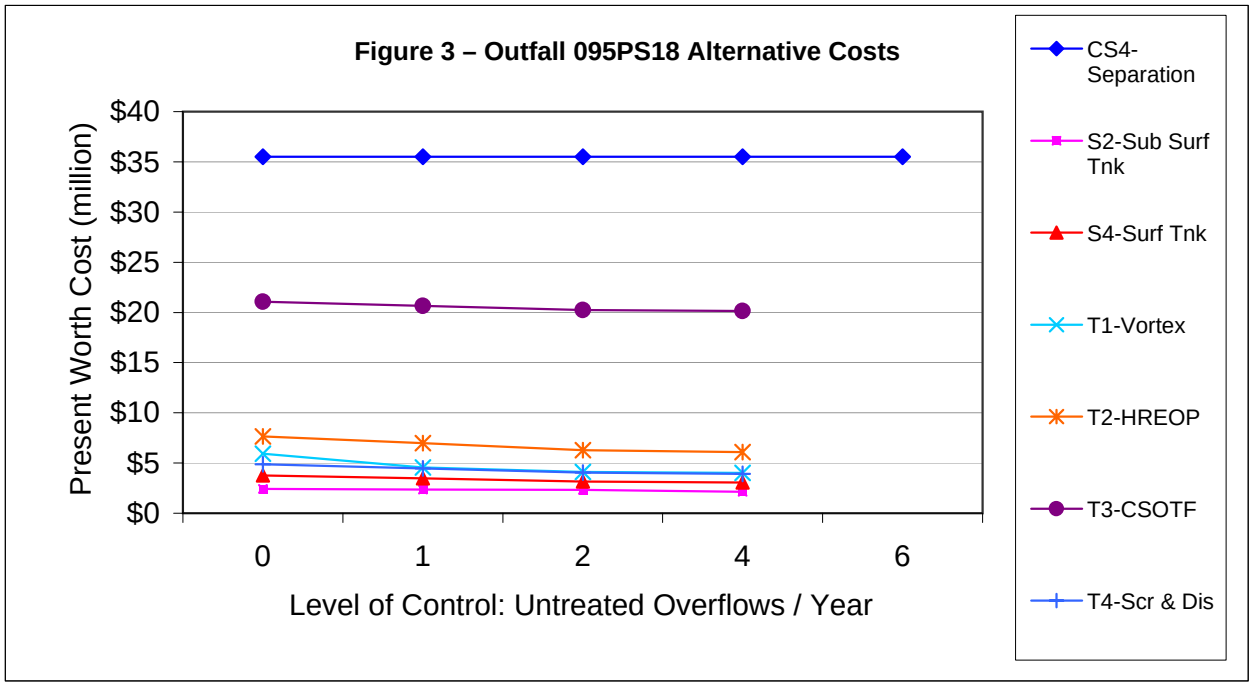


Figure 3 – Outfall 095PS18 Alternative Costs
Present Worth Cost (million)
$40
$35
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 095PS18 |
| **Location Name** | S-18 |
| **Model ID** | ADC 095PS18-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 095PS18 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 6 | |
| Peak Volume: | 5,499 | $ft^3$ |
| | 0.04 | MG |
| Total Volume: | 20,230 | $ft^3$ |
| | 0.15 | MG |
| Peak Rate: | 7.50 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:41 | 89 | 8/20/2005 19:50 | 5499.25 | 41.137 | 0 | 5.93 | 1 |
| 9/29/2005 5:30 | 25 | 9/29/2005 5:45 | 5429.69 | 40.617 | 1 | 7.50 | 0 |
| 7/26/2005 19:50 | 30 | 7/26/2005 20:15 | 5165.37 | 38.640 | 2 | 4.38 | 2 |
| 9/16/2005 21:20 | 19 | 9/16/2005 21:30 | 1870.89 | 13.995 | 3 | 3.97 | 4 |
| 7/17/2005 16:20 | 15 | 7/17/2005 16:30 | 1862.72 | 13.934 | 4 | 4.26 | 3 |
| 4/23/2005 3:56 | 23 | 4/23/2005 4:15 | 401.84 | 3.006 | 5 | 0.44 | 5 |

# Region 1

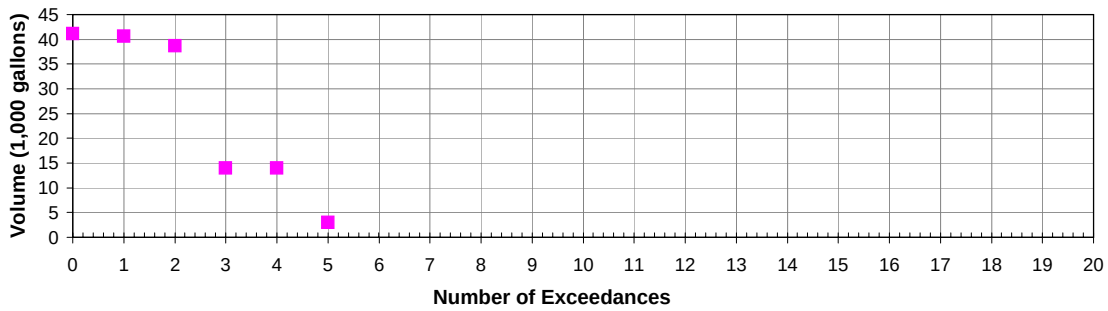
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 095PS18 |
| **Location Name** | S-18 |
| **Model ID** | ADC 095PS18-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 095PS18 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

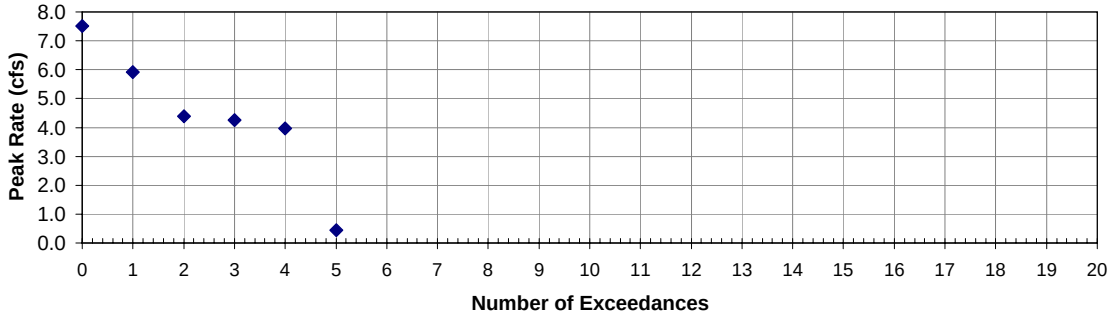
**Results Summary**

| | |
|---|---|
| Number of Events: | 6 |
| Peak Volume: | 5,499 $ft^3$ |
| | 0.04 MG |
| Total Volume: | 20,230 $ft^3$ |
| | 0.15 MG |
| Peak Rate: | 7.50 cfs |

### Figure 1 - Outfall 095PS18 CSO Volume




### Figure 2 - Outfall 095PS18 CSO Peak Flow Rate



## D.26.1 S-18 – SAW MILL RUN INTERCEPTOR SEWERSHED – NPDES# 095PS18

### Description of Outfall

Outfall 095PS18 conveys overflows from the ALCOSAN diversion chamber S-18 to Saw Mill Run. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run adjacent to Saw Mill Run Boulevard near Overbrook Boulevard in the City of Pittsburgh. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 095PS18 Sewershed (S-18) consists of 235 acres, or approximately 4.96 % of the total service area. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 095PS18 typically experiences 6 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 095PS18 is approximately 0.04 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 095PS18 is approximately 7.50 CFS. *Figure 1 – Outfall 095PS18 CSO Volume* and *Figure 2 – Outfall 095PS18 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 6 largest CSO events during the typical year baseline conditions simulation.

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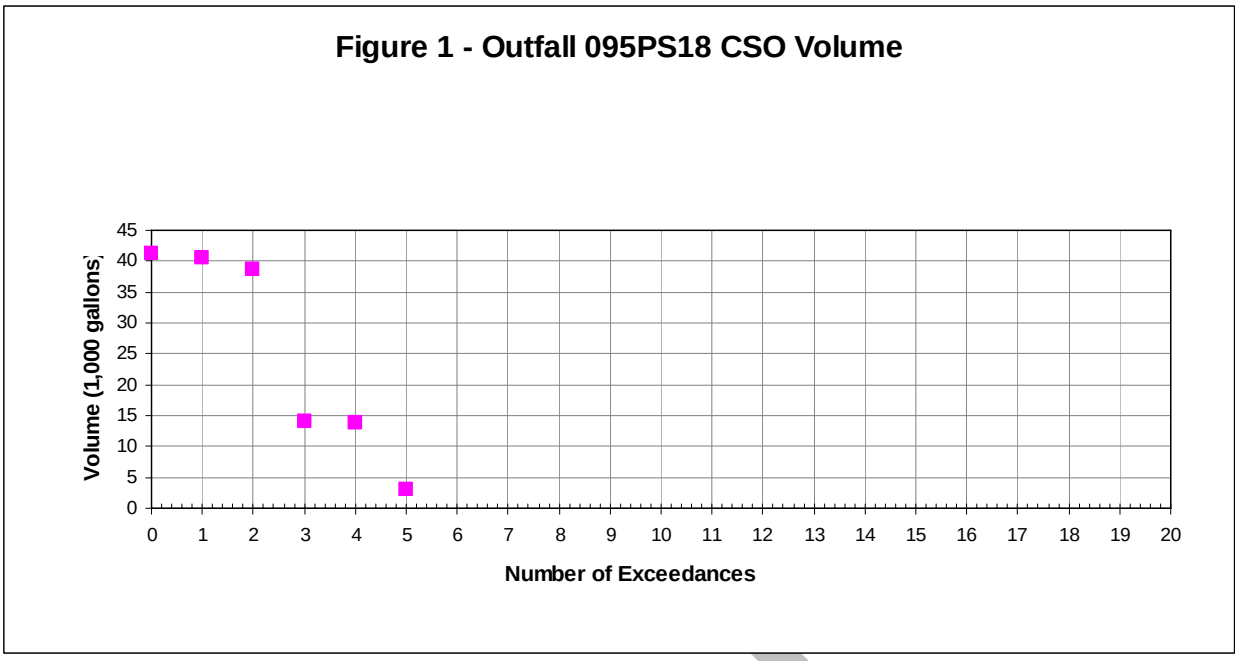


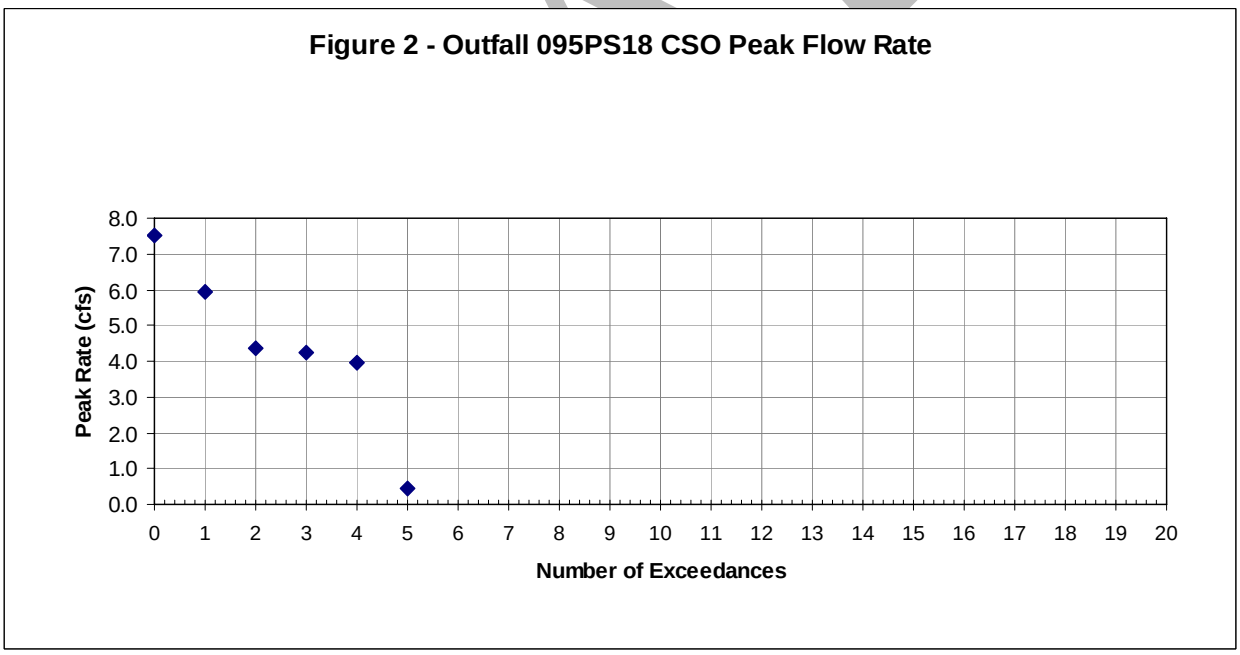


There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 095PS18, south of the outfall location. The site is generally bounded by the Busway to the west, Saw Mill Run Boulevard to the east and private development to the north and south.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 095PS18. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-095PS18: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-095PS18: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-095PS18: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-095PS18: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-095PS18: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-095PS18: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-095PS18: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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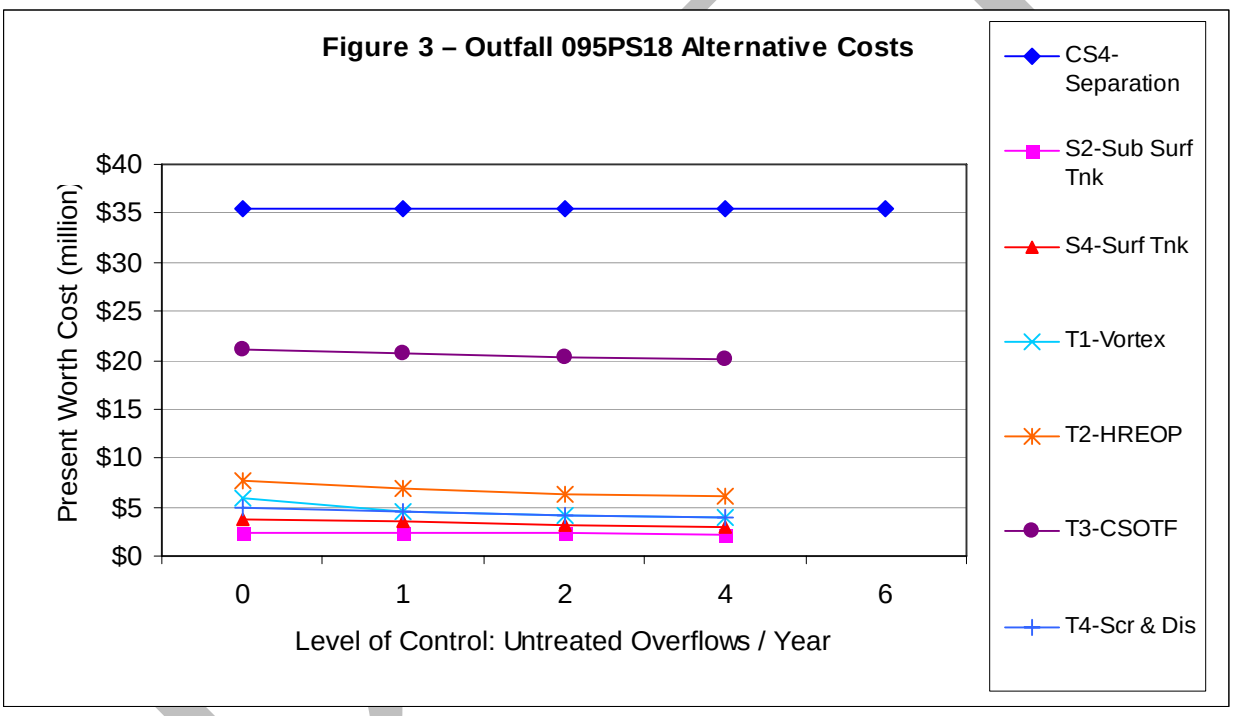
**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 095PS18 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.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**Recommendations**

Based upon the above, for control levels 0 through 4, it is recommended that Alternative S2-095PS18: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. There are only 5 overflows for this outfall so no recommendations are made or graph shown for control level 6.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

It appears that space is available for the construction of a sub-surface storage facility for all control levels.

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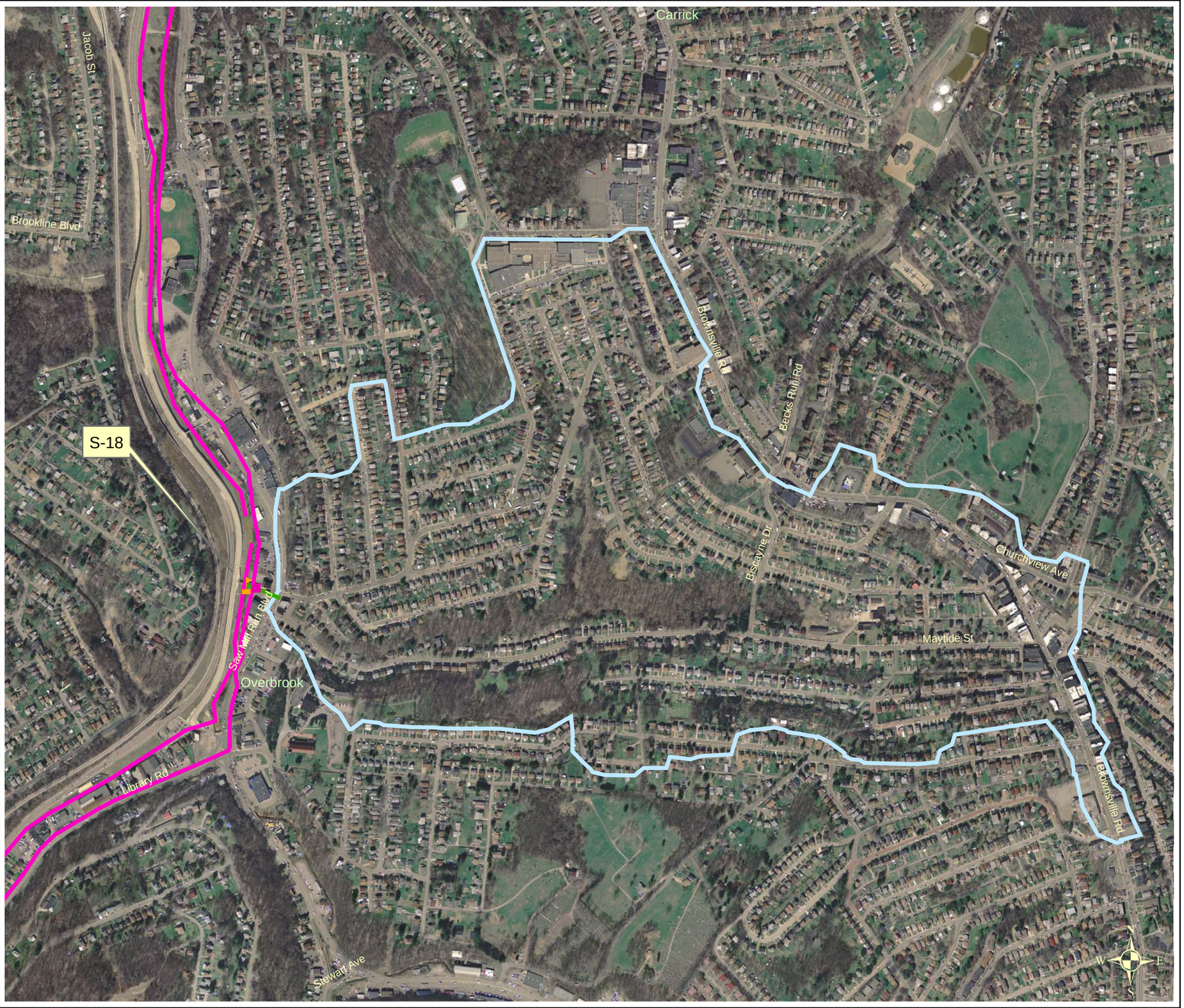


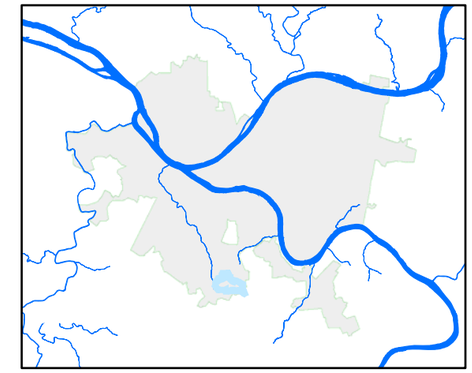

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 600 1,200 Feet

# Attachment 1
# S-18
# Tributary Area Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

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# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 235 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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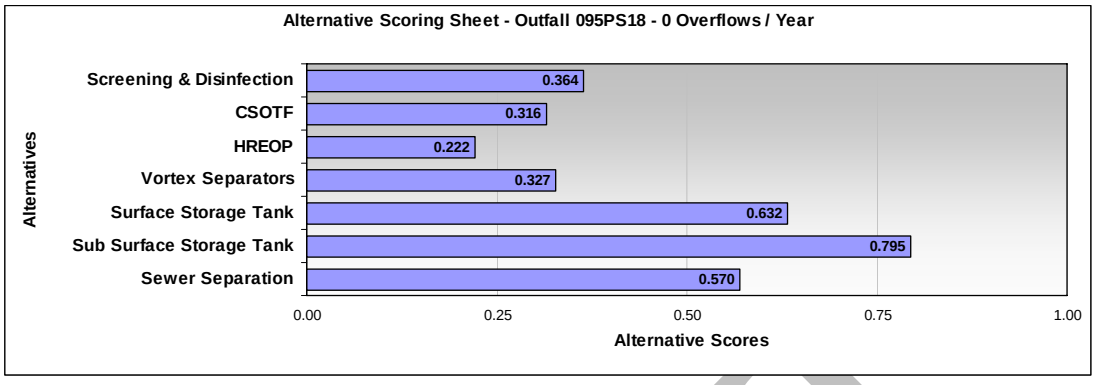
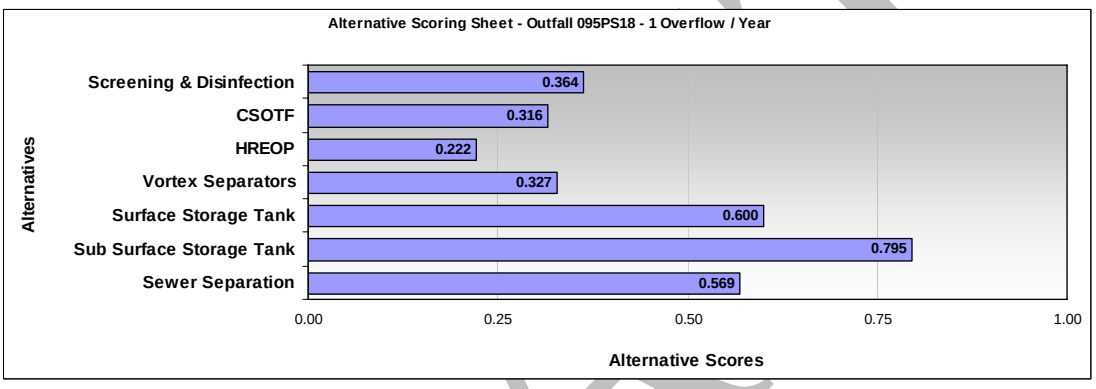
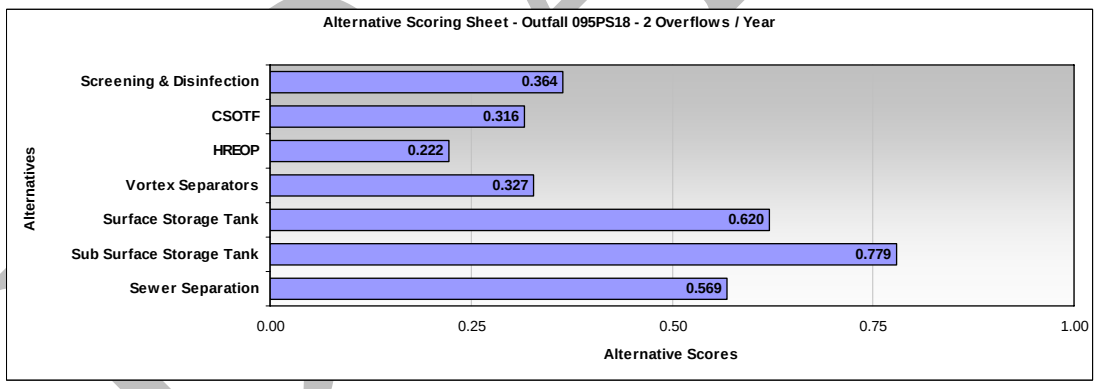
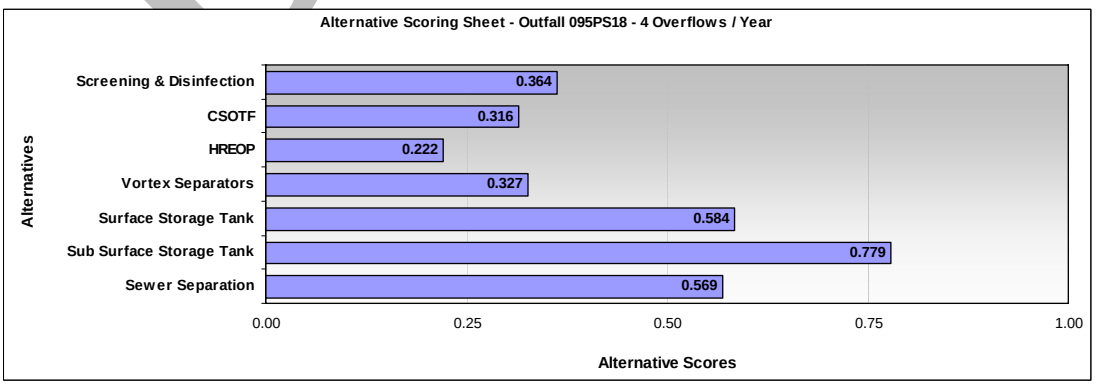
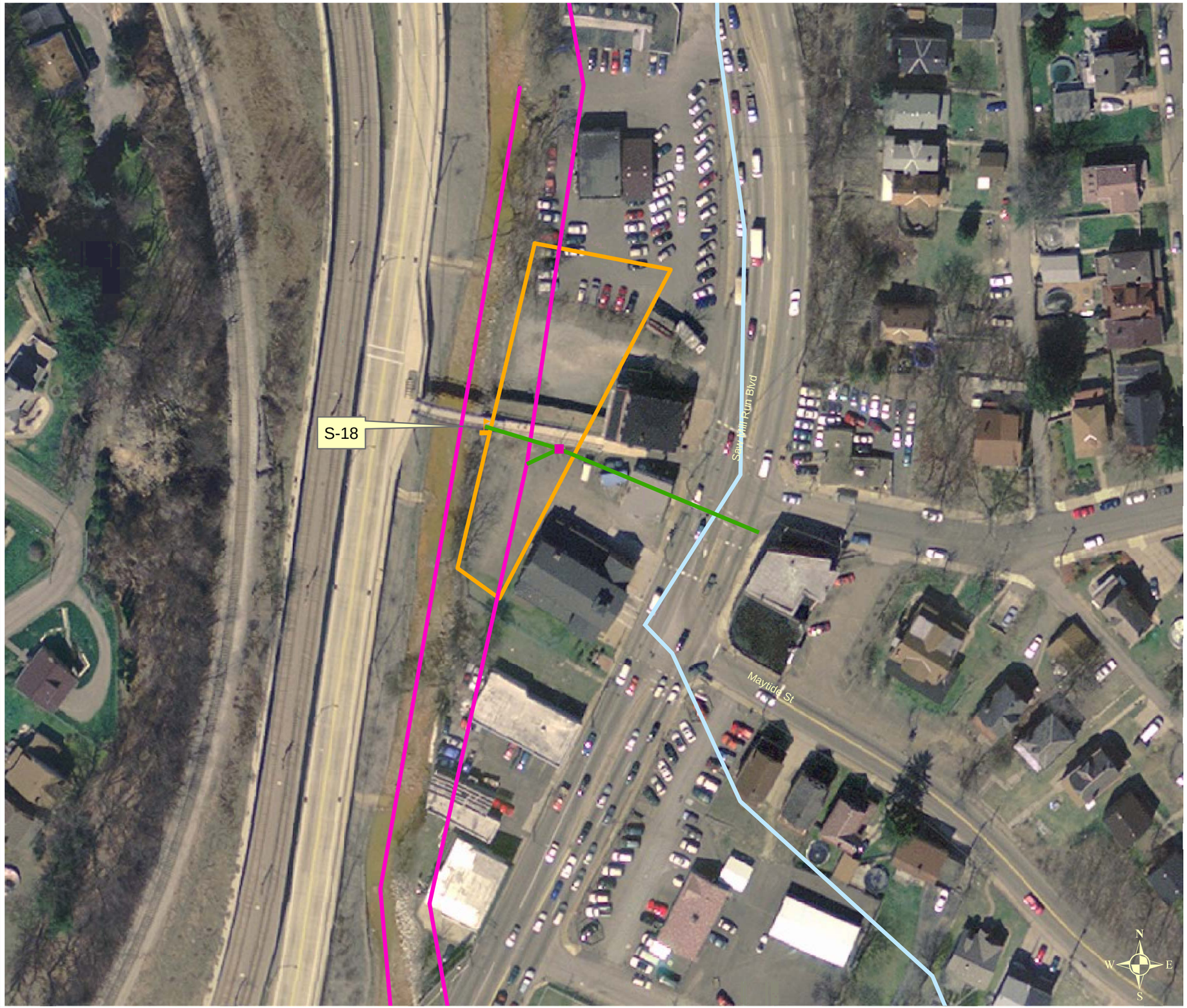
# Attachment 3 – Alternative Scoring Sheet

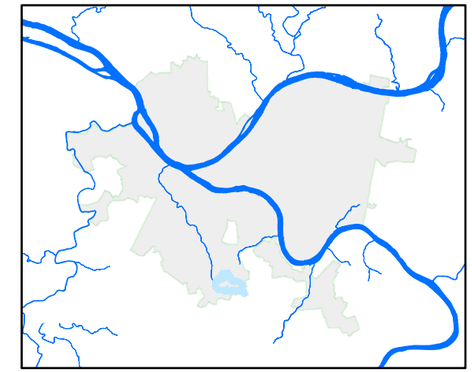




Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 75 150 Feet

# Attachment 4
# S-18
# Facilities Boundary Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 4 | 4 | 4 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 3 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.520** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.600** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.600** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.584** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.584** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.552** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.497** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.412** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.639** |

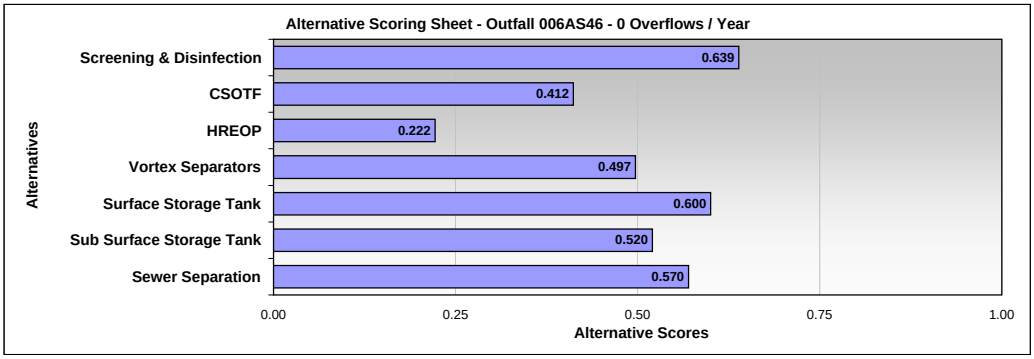
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

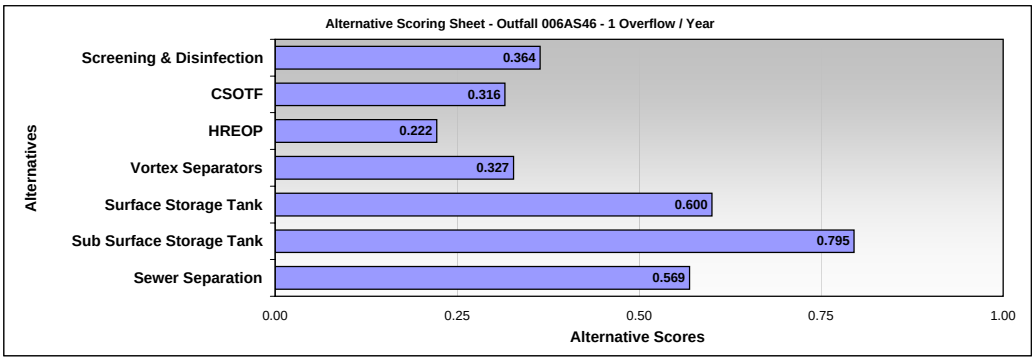
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

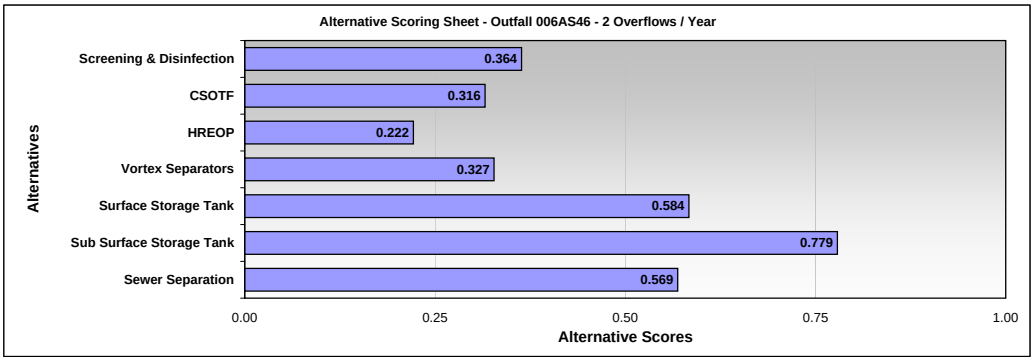
Total Score

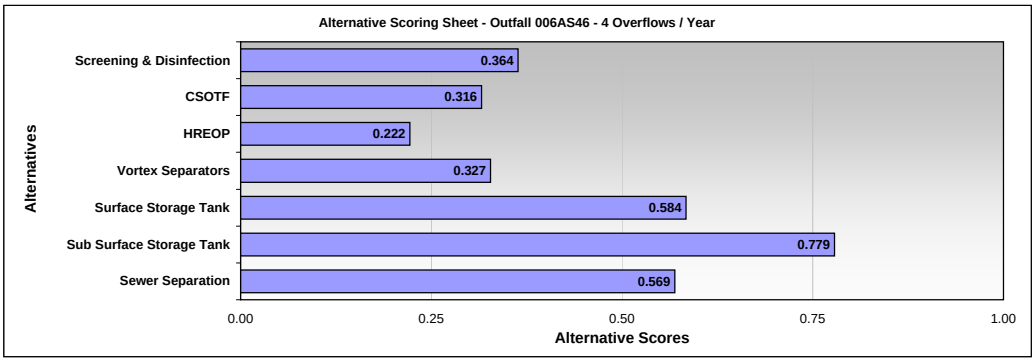
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

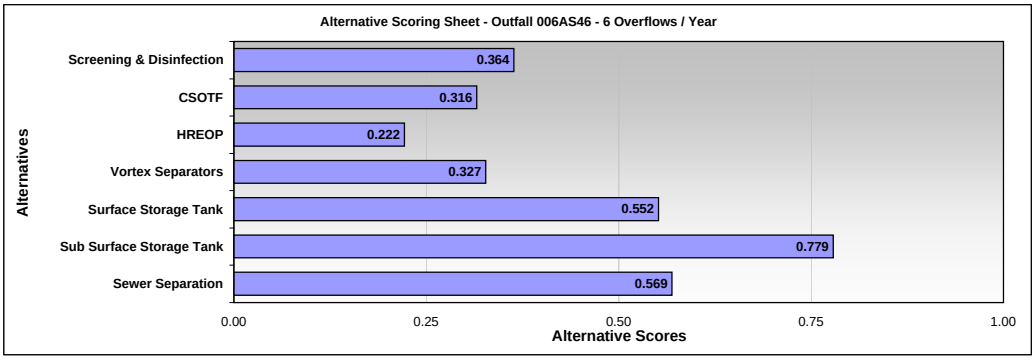
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |


Alternative Scoring Sheet - Outfall 006AS46 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.639
0.412
0.222
0.497
0.600
0.520
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 006AS46 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.600
0.795
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 006AS46 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.584
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 006AS46 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.584
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 006AS46 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.552
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 135 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **20,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 58,806 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **20,407,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 18.38 | 2,457,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 21.62 | 2,891,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 539 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 359 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 21.71 | 2,902,515 | **Sufficient Volume** |
| Tank Area (SF) | | 194,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **22,517,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 30.10 | 46.58 | = Peak Rate |
| Force Main Diameter (In) | | 38 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,324,000** | **$ 46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 46.58 | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,337,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 21,690 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **1,020,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 30.10 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 293,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **586,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **31,422,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 18.38 | 2,457,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 21.62 | 2,891,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 539 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 359 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 21.71 | 2,902,515 | **Sufficient Volume** |
| Tank Area (SF) | | 194,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **57,517,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 18.38 | 28.44 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 29 | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,894,000** | **$ 37,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 46.58 | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,337,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 216,850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,201,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 30.10 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 293,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **586,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 70,164,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 30.10 | | 46.58 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 4 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **2,417,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 33.11 | | 51.23 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 40 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,691,000** | **$** | **48,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 46.58 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 115,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 5,750 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **361,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 30.10 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 33.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 91 | | 43 | |
| Passes / Detention (Min) | | 3 | | **15.28** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **991,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 31,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **62,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **11,759,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 30.10 | 46.58 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 5,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 102 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 51 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.47 | 62,424 | |
| **Construction Cost (CSOTF)** | **$** | **16,371,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 30.10 | 46.58 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 38 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,324,000** | **$ 46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 46.58 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 94,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 4,700 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **308,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 30.10 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 30.10 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 86 | 42 | |
| Passes / Detention (Min) | | 3 | **15.51** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **936,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 17,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **34,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **24,948,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 30.10 | | 46.58 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 360 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 28 | | **OK** | Input by Engineer |
| Width (Ft) | | 14 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **5,988,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 33.11 | | 51.23 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 40 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,691,000** | **$** | **48,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 46.58 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 9,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **49,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 30.10 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 33.11 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 91 | | 43 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.28** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 991,000 | $ | 869,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,860,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 36,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **72,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **15,637,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 2,457,194 | CF |
| | 18.38 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 46.58 | CFS |
| | 30.10 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 30.10 | | 46.58 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,806,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 30.10 | | 46.58 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 38 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,324,000** | **$** | **46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 46.58 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 9,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 470 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **51,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 30.10 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 86 | | 42 | |
| Passes / Detention (Min) | | 3 | | **15.51** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 936,000 | $ | 819,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,755,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 26,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **9,157,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 135 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **20,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 58,806 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **20,407,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.54 | | 72,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.64 | | 85,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 93 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 62 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.65 | | 86,490 | **Sufficient Volume** |
| Tank Area (SF) | 6,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **484,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 28.03 | | 43.37 | = Peak Rate |
| Force Main Diameter (In) | 36 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **5,071,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 43.37 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 128,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 640 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **65,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 28.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,710,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 27,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **54,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **7,551,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.54 | | 72,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.64 | | 85,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 93 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 62 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.65 | | 86,490 | **Sufficient Volume** |
| Tank Area (SF) | 6,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,584,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.54 | | 0.84 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 5 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **745,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 43.37 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 128,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 6,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **392,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 28.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,710,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 27,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **54,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,623,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 28.03 | | 43.37 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 30.83 | | 47.71 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 38 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,413,000** | **$** | **46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 43.37 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 28.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,710,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 30.83 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 87 | | 42 | |
| Passes | | 3 | | **15.32** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **950,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 29,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,560,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 28.03 | 43.37 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 4,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 98 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 49 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.43 | 57,624 | |
| **Construction Cost (CSOTF)** | **$** | **16,371,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 28.03 | 43.37 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 36 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,071,000** | **$ 44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 43.37 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 86,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 4,300 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **287,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 28.03 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,710,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 28.03 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 83 | 40 | |
| Passes | | 3 | **15.31** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **898,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 16,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **24,536,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 28.03 | | 43.37 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 330 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 27 | | **OK** | Input by Engineer |
| Width (Ft) | | 13 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **5,652,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 30.83 | | 47.71 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 38 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,413,000** | **$** | **46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 43.37 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 28.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,710,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 30.83 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 87 | | 42 | Input by Engineer |
| Passes | | 3 | | **15.32** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 950,000 | $ | 827,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,777,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 35,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **14,836,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 72,491 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 43.37 | CFS |
| | 28.03 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 28.03 | | 43.37 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,710,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 28.03 | | 43.37 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 36 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,071,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 43.37 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 440 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **48,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 28.03 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 83 | | 40 | |
| Passes | | 3 | | **15.31** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 898,000 | $ | 775,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,673,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **8,719,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 135 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **20,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 58,806 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **20,407,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.54 | | 72,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.64 | | 85,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 93 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 62 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.65 | | 86,490 | **Sufficient Volume** |
| Tank Area (SF) | 6,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **483,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 25.54 | | 39.52 | = Peak Rate |
| Force Main Diameter (In) | 35 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **4,767,000** | **$** | **43,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 39.52 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 128,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 640 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **65,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 25.54 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,595,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 27,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **54,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **7,130,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.54 | | 72,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.64 | | 85,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 93 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 62 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.65 | | 86,490 | **Sufficient Volume** |
| Tank Area (SF) | 6,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,580,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.54 | | 0.84 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 5 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **744,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 39.52 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 128,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 6,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **392,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 25.54 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,595,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 27,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **54,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,503,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 25.54 | | 39.52 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 28.09 | | 43.47 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 36 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,079,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 39.52 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 25.54 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,595,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 28.09 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 84 | | 40 | |
| Passes | | 3 | | **15.46** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **899,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 27,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,054,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 25.54 | | 39.52 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 4,300 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 94 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 47 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.40 | | 53,016 | |
| **Construction Cost (CSOTF)** | **$** | **16,370,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.54 | | 39.52 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 35 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,767,000** | **$** | **43,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 39.52 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 80,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 4,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **271,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 25.54 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,595,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 25.54 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 80 | | 38 | |
| Passes | | 3 | | **15.39** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **851,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 15,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **30,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **24,050,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 25.54 | | 39.52 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 310 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 26 | | **OK** | Input by Engineer |
| Width (Ft) | | 13 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **5,251,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 28.09 | | 43.47 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 36 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **5,079,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 39.52 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 25.54 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,595,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 28.09 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 84 | | 40 | Input by Engineer |
| Passes | | 3 | | **15.46** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 899,000 | $ | 782,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,681,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 34,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **68,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **13,886,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 72,298 | CF |
| | 0.54 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 39.52 | CFS |
| | 25.54 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | |
| 2 Overflows / Year | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 25.54 | | 39.52 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 1,595,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 25.54 | | 39.52 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 35 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 4,767,000** | **$** | **43,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 39.52 | | | Ref: CSO Statistics |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 7,900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 45,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 25.54 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 80 | | 38 | |
| Passes | 3 | | **15.39** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ 851,000 | $ | 732,000 | |
| **Construction Cost (Disinfection)** | **$ 1,583,000** | | | |
| **6. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 50,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | **8,206,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 135 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **20,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 58,806 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **20,407,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.33 | | 44,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.39 | | 52,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 73 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 49 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.40 | | 53,655 | **Sufficient Volume** |
| Tank Area (SF) | 4,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **280,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 16.94 | | 26.21 | = Peak Rate |
| Force Main Diameter (In) | 28 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **3,718,000** | **$** | **36,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 26.21 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 78,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 390 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **44,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 16.94 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,197,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,446,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.33 | 44,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.39 | 52,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 73 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 49 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.40 | 53,655 | **Sufficient Volume** |
| Tank Area (SF) | | 4,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,925,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.33 | 0.51 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 4 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **563,000** | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 26.21 | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 78,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,900 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **266,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 16.94 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,197,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 24,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **4,136,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 16.94 | | 26.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 18.63 | | 28.83 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 30 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,925,000** | **$** | **38,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 26.21 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 16.94 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,197,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 18.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 68 | | 33 | |
| Passes | | 3 | | **15.57** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **719,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 18,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **36,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,298,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 16.94 | 26.21 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 77 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 39 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.27 | 36,036 | |
| **Construction Cost (CSOTF)** | **$** | **16,374,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 16.94 | 26.21 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 28 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,718,000** | **$ 36,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 26.21 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 54,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,700 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **199,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 16.94 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,197,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 16.94 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 65 | 31 | |
| Passes | | 3 | **15.38** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **685,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 12,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **24,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **22,356,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 16.94 | | 26.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 200 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 21 | | **OK** | Input by Engineer |
| Width (Ft) | | 11 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,872,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 18.63 | | 28.83 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 30 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,925,000** | **$** | **38,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 26.21 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 300 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **36,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 16.94 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,197,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 18.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 68 | | 33 | Input by Engineer |
| Passes | | 3 | | **15.57** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 719,000 | $ | 600,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,319,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 30,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **60,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **10,570,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 43,874 | CF |
| | 0.33 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 26.21 | CFS |
| | 16.94 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 16.94 | | 26.21 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,197,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 16.94 | | 26.21 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 28 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,718,000** | **$** | **36,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 26.21 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 260 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **32,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 16.94 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 65 | | 31 | |
| Passes | | 3 | | **15.38** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 685,000 | $ | 563,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,248,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **6,402,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 135 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **20,250,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 58,806 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **20,407,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.28 | | 38,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.33 | | 45,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 68 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 46 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.35 | | 46,920 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **239,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 13.70 | | 21.20 | = Peak Rate |
| Force Main Diameter (In) | 25 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **3,323,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 21.20 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 68,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 340 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **39,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 13.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,047,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 23,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **46,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,829,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.28 | | 38,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.33 | | 45,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 68 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 46 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.35 | | 46,920 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,788,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.28 | | 0.44 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **526,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 21.20 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 68,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **239,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 13.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,047,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 23,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **46,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,762,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.70 | | 21.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 15.07 | | 23.32 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 27 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,490,000** | **$** | **35,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 13.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,047,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 15.07 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 61 | | 30 | |
| Passes | | 3 | | **15.70** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **648,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 14,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **28,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,610,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.70 | 21.20 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,300 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 69 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 34 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.21 | 28,152 | |
| **Construction Cost (CSOTF)** | **$** | **16,378,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.70 | 21.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 25 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,323,000** | **$ 33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 21.20 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 42,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **164,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 13.70 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,047,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 13.70 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | 28 | |
| Passes | | 3 | **15.59** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **621,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 10,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 21,688,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.70 | | 21.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 170 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 19 | | **OK** | Input by Engineer |
| Width (Ft) | | 10 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,357,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 15.07 | | 23.32 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 27 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,490,000** | **$** | **35,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 250 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **31,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 13.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,047,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 15.07 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 61 | | 30 | Input by Engineer |
| Passes | | 3 | | **15.70** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 648,000 | $ | 529,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,177,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 28,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **56,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **9,295,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 47 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 37,940 | CF |
| | 0.28 | MG |
| Total Volume | 3,106,635 | CF |
| | 23.24 | MG |
| Peak Rate | 21.20 | CFS |
| | 13.70 | MGD |

| Capital Costs - 006AS46 / Sewershed ACSO 006AS46 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 13.70 | | 21.20 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,047,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 13.70 | | 21.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 25 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,323,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.20 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 210 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **27,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 13.70 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | | 28 | |
| Passes | | 3 | | **15.59** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 621,000 | $ | 500,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,121,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **5,701,000** | | | |

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| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 30.10 | $182,777 | 20 | 10.910 | $1,994,082 |
| | Tank O&M | No. Events / Yr | 47 | $85,169 | 50 | 14.484 | $1,233,557 |
| | | Const Cost ($) | $22,517,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 30 | $10,096 | 20 | 10.910 | $110,147 |
| | Odor Control O&M | Capacity (cfm) | 21,690 | $75,915 | 20 | 10.910 | $828,228 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $29,409 |
| | | | **Total Annual O&M** | **$354,000** | | **Total PW O&M** | **$4,195,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 18.38 | $131,460 | 20 | 10.910 | $1,434,225 |
| | Tank O&M | No. Events / Yr | 47 | $172,669 | 50 | 14.484 | $2,500,872 |
| | | Const Cost ($) | $57,517,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 30 | $10,096 | 20 | 10.910 | $110,147 |
| | Odor Control O&M | Capacity (cfm) | 216,850 | $758,975 | 20 | 10.910 | $8,280,371 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $37,667 |
| | | | **Total Annual O&M** | **$1,074,000** | | **Total PW O&M** | **$12,363,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 30.10 | $182,777 | 20 | 10.910 | $1,994,082 |
| | Sed. Basin O&M | Flow Rate (mgd) | 30.10 | $3,386 | 50 | 14.484 | $49,045 |
| | Screening O&M | Flow Rate (mgd) | 30.10 | $10,096 | 20 | 10.910 | $110,147 |
| | Disinfection O&M | Flow Rate (mgd) | 30.10 | $127,947 | 20 | 10.910 | $1,395,895 |
| | Odor Control O&M | Capacity (cfm) | 4,700.00 | $16,450 | 20 | 10.910 | $179,469 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $30,018 |
| | | | **Total Annual O&M** | **$341,000** | | **Total PW O&M** | **$3,759,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 33.11 | $194,794 | 20 | 10.910 | $2,125,189 |
| | HREP O&M | Flow Rate (mgd) | 30.10 | $172,486 | 20 | 10.910 | $1,881,810 |
| | Screening O&M | Flow Rate (mgd) | 30.10 | $10,096 | 20 | 10.910 | $110,147 |
| | Disinfection O&M | Flow Rate (mgd) | 33.11 | $135,596 | 20 | 10.910 | $1,479,344 |
| | Odor Control O&M | Capacity (cfm) | 450.00 | $1,575 | 20 | 10.910 | $17,183 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $47,248 |
| | | | **Total Annual O&M** | **$515,000** | | **Total PW O&M** | **$5,661,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 33.11 | $194,794 | 20 | 10.910 | $2,125,189 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 30.10 | $3,386 | 20 | 10.910 | $36,944 |
| | Screening O&M | Flow Rate (mgd) | 30.10 | $10,096 | 20 | 10.910 | $110,147 |
| | Disinfection O&M | Flow Rate (mgd) | 33.11 | $135,596 | 20 | 10.910 | $1,479,344 |
| | Odor Control O&M | Capacity (cfm) | 5,750.00 | $20,125 | 20 | 10.910 | $219,563 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $35,096 |
| | | | **Total Annual O&M** | **$364,000** | | **Total PW O&M** | **$4,006,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 30.10 | $182,777 | 20 | 10.910 | $1,994,082 |
| | Screening O&M | Flow Rate (mgd) | 30.10 | $10,096 | 20 | 10.910 | $110,147 |
| | Disinfection O&M | Flow Rate (mgd) | 30.10 | $127,947 | 20 | 10.910 | $1,395,895 |
| | Odor Control O&M | Capacity (cfm) | 470.00 | $1,645 | 20 | 10.910 | $17,947 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $29,319 |
| | | | **Total Annual O&M** | **$323,000** | | **Total PW O&M** | **$3,547,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 28.03 | $174,277 | 20 | 10.910 | $1,901,354 |
| | Tank O&M | No. Events / Yr | 47 | $30,087 | 50 | 14.484 | $435,765 |
| | | Const Cost ($) | $484,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 28 | $9,902 | 20 | 10.910 | $108,035 |
| | Odor Control O&M | Capacity (cfm) | 640 | $2,240 | 20 | 10.910 | $24,438 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,518 |
| | | | **Total Annual O&M** | **$217,000** | | **Total PW O&M** | **$2,495,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.54 | $12,488 | 20 | 10.910 | $136,245 |
| | Tank O&M | No. Events / Yr | 47 | $35,337 | 50 | 14.484 | $511,804 |
| | | Const Cost ($) | $2,584,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 28 | $9,902 | 20 | 10.910 | $108,035 |
| | Odor Control O&M | Capacity (cfm) | 6,400 | $22,400 | 20 | 10.910 | $244,383 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,757 |
| | | | **Total Annual O&M** | **$81,000** | | **Total PW O&M** | **$1,009,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 28.03 | $174,277 | 20 | 10.910 | $1,901,354 |
| | Sed. Basin O&M | Flow Rate (mgd) | 28.03 | $3,153 | 50 | 14.484 | $45,671 |
| | Screening O&M | Flow Rate (mgd) | 28.03 | $9,902 | 20 | 10.910 | $108,035 |
| | Disinfection O&M | Flow Rate (mgd) | 28.03 | $122,511 | 20 | 10.910 | $1,336,583 |
| | Odor Control O&M | Capacity (cfm) | 4,300.00 | $15,050 | 20 | 10.910 | $164,195 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $28,564 |
| | | | **Total Annual O&M** | **$325,000** | | **Total PW O&M** | **$3,584,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 30.83 | $185,736 | 20 | 10.910 | $2,026,364 |
| | HREP O&M | Flow Rate (mgd) | 28.03 | $165,405 | 20 | 10.910 | $1,804,563 |
| | Screening O&M | Flow Rate (mgd) | 28.03 | $9,902 | 20 | 10.910 | $108,035 |
| | Disinfection O&M | Flow Rate (mgd) | 30.83 | $129,834 | 20 | 10.910 | $1,416,486 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $44,816 |
| | | | **Total Annual O&M** | **$493,000** | | **Total PW O&M** | **$5,416,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 30.83 | $185,736 | 20 | 10.910 | $2,026,364 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 28.03 | $3,153 | 20 | 10.910 | $34,403 |
| | Screening O&M | Flow Rate (mgd) | 28.03 | $9,902 | 20 | 10.910 | $108,035 |
| | Disinfection O&M | Flow Rate (mgd) | 30.83 | $129,834 | 20 | 10.910 | $1,416,486 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $29,320 |
| | | | **Total Annual O&M** | **$329,000** | | **Total PW O&M** | **$3,615,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 28.03 | $174,277 | 20 | 10.910 | $1,901,354 |
| | Screening O&M | Flow Rate (mgd) | 28.03 | $9,902 | 20 | 10.910 | $108,035 |
| | Disinfection O&M | Flow Rate (mgd) | 28.03 | $122,511 | 20 | 10.910 | $1,336,583 |
| | Odor Control O&M | Capacity (cfm) | 440.00 | $1,540 | 20 | 10.910 | $16,801 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $27,914 |
| | | | **Total Annual O&M** | **$309,000** | | **Total PW O&M** | **$3,391,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 25.54 | $163,773 | 20 | 10.910 | $1,786,758 |
| | Tank O&M | No. Events / Yr | 47 | $30,084 | 50 | 14.484 | $435,729 |
| | | Const Cost ($) | $483,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 26 | $9,672 | 20 | 10.910 | $105,517 |
| | Odor Control O&M | Capacity (cfm) | 640 | $2,240 | 20 | 10.910 | $24,438 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,965 |
| | | | **Total Annual O&M** | **$206,000** | | **Total PW O&M** | **$2,376,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.54 | $12,466 | 20 | 10.910 | $136,003 |
| | Tank O&M | No. Events / Yr | 47 | $35,327 | 50 | 14.484 | $511,659 |
| | | Const Cost ($) | $2,580,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 26 | $9,672 | 20 | 10.910 | $105,517 |
| | Odor Control O&M | Capacity (cfm) | 6,400 | $22,400 | 20 | 10.910 | $244,383 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,440 |
| | | | **Total Annual O&M** | **$80,000** | | **Total PW O&M** | **$1,006,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 25.54 | $163,773 | 20 | 10.910 | $1,786,758 |
| | Sed. Basin O&M | Flow Rate (mgd) | 25.54 | $2,873 | 50 | 14.484 | $41,614 |
| | Screening O&M | Flow Rate (mgd) | 25.54 | $9,672 | 20 | 10.910 | $105,517 |
| | Disinfection O&M | Flow Rate (mgd) | 25.54 | $115,759 | 20 | 10.910 | $1,262,928 |
| | Odor Control O&M | Capacity (cfm) | 4,000.00 | $14,000 | 20 | 10.910 | $152,739 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,840 |
| | | | **Total Annual O&M** | **$307,000** | | **Total PW O&M** | **$3,376,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 28.09 | $174,541 | 20 | 10.910 | $1,904,233 |
| | HREP O&M | Flow Rate (mgd) | 25.54 | $156,598 | 20 | 10.910 | $1,708,470 |
| | Screening O&M | Flow Rate (mgd) | 25.54 | $9,672 | 20 | 10.910 | $105,517 |
| | Disinfection O&M | Flow Rate (mgd) | 28.09 | $122,680 | 20 | 10.910 | $1,338,428 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $41,911 |
| | | | **Total Annual O&M** | **$465,000** | | **Total PW O&M** | **$5,114,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 28.09 | $174,541 | 20 | 10.910 | $1,904,233 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 25.54 | $2,873 | 20 | 10.910 | $31,346 |
| | Screening O&M | Flow Rate (mgd) | 25.54 | $9,672 | 20 | 10.910 | $105,517 |
| | Disinfection O&M | Flow Rate (mgd) | 28.09 | $122,680 | 20 | 10.910 | $1,338,428 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $27,506 |
| | | | **Total Annual O&M** | **$310,000** | | **Total PW O&M** | **$3,407,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 25.54 | $163,773 | 20 | 10.910 | $1,786,758 |
| | Screening O&M | Flow Rate (mgd) | 25.54 | $9,672 | 20 | 10.910 | $105,517 |
| | Disinfection O&M | Flow Rate (mgd) | 25.54 | $115,759 | 20 | 10.910 | $1,262,928 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,225 |
| | | | **Total Annual O&M** | **$291,000** | | **Total PW O&M** | **$3,197,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 16.94 | $124,482 | 20 | 10.910 | $1,358,092 |
| | Tank O&M | No. Events / Yr | 47 | $29,577 | 50 | 14.484 | $428,378 |
| | | Const Cost ($) | $280,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 17 | $8,892 | 20 | 10.910 | $97,012 |
| | Odor Control O&M | Capacity (cfm) | 390 | $1,365 | 20 | 10.910 | $14,892 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,545 |
| | | | **Total Annual O&M** | **$165,000** | | **Total PW O&M** | **$1,917,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.33 | $8,929 | 20 | 10.910 | $97,414 |
| | Tank O&M | No. Events / Yr | 47 | $33,689 | 50 | 14.484 | $487,942 |
| | | Const Cost ($) | $1,925,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 17 | $8,892 | 20 | 10.910 | $97,012 |
| | Odor Control O&M | Capacity (cfm) | 3,900 | $13,650 | 20 | 10.910 | $148,921 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,276 |
| | | | **Total Annual O&M** | **$66,000** | | **Total PW O&M** | **$838,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 16.94 | $124,482 | 20 | 10.910 | $1,358,092 |
| | Sed. Basin O&M | Flow Rate (mgd) | 16.94 | $1,906 | 50 | 14.484 | $27,600 |
| | Screening O&M | Flow Rate (mgd) | 16.94 | $8,892 | 20 | 10.910 | $97,012 |
| | Disinfection O&M | Flow Rate (mgd) | 16.94 | $90,141 | 20 | 10.910 | $983,434 |
| | Odor Control O&M | Capacity (cfm) | 2,700.00 | $9,450 | 20 | 10.910 | $103,099 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,830 |
| | | | **Total Annual O&M** | **$235,000** | | **Total PW O&M** | **$2,590,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 18.63 | $132,667 | 20 | 10.910 | $1,447,384 |
| | HREP O&M | Flow Rate (mgd) | 16.94 | $123,003 | 20 | 10.910 | $1,341,951 |
| | Screening O&M | Flow Rate (mgd) | 16.94 | $8,892 | 20 | 10.910 | $97,012 |
| | Disinfection O&M | Flow Rate (mgd) | 18.63 | $95,530 | 20 | 10.910 | $1,042,226 |
| | Odor Control O&M | Capacity (cfm) | 300.00 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $31,855 |
| | | | **Total Annual O&M** | **$362,000** | | **Total PW O&M** | **$3,972,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 18.63 | $132,667 | 20 | 10.910 | $1,447,384 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 16.94 | $1,906 | 20 | 10.910 | $20,790 |
| | Screening O&M | Flow Rate (mgd) | 16.94 | $8,892 | 20 | 10.910 | $97,012 |
| | Disinfection O&M | Flow Rate (mgd) | 18.63 | $95,530 | 20 | 10.910 | $1,042,226 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,226 |
| | | | **Total Annual O&M** | **$239,000** | | **Total PW O&M** | **$2,629,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 16.94 | $124,482 | 20 | 10.910 | $1,358,092 |
| | Screening O&M | Flow Rate (mgd) | 16.94 | $8,892 | 20 | 10.910 | $97,012 |
| | Disinfection O&M | Flow Rate (mgd) | 16.94 | $90,141 | 20 | 10.910 | $983,434 |
| | Odor Control O&M | Capacity (cfm) | 260.00 | $910 | 20 | 10.910 | $9,928 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,376 |
| | | | **Total Annual O&M** | **$225,000** | | **Total PW O&M** | **$2,469,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 13.70 | $108,029 | 20 | 10.910 | $1,178,586 |
| | Tank O&M | No. Events / Yr | 47 | $29,474 | 50 | 14.484 | $426,894 |
| | | Const Cost ($) | $239,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 14 | $8,605 | 20 | 10.910 | $93,885 |
| | Odor Control O&M | Capacity (cfm) | 340 | $1,190 | 20 | 10.910 | $12,983 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,512 |
| | | | **Total Annual O&M** | **$148,000** | | **Total PW O&M** | **$1,729,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.28 | $8,103 | 20 | 10.910 | $88,401 |
| | Tank O&M | No. Events / Yr | 47 | $33,347 | 50 | 14.484 | $482,981 |
| | | Const Cost ($) | $1,788,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 14 | $8,605 | 20 | 10.910 | $93,885 |
| | Odor Control O&M | Capacity (cfm) | 3,400 | $11,900 | 20 | 10.910 | $129,828 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,644 |
| | | | **Total Annual O&M** | **$62,000** | | **Total PW O&M** | **$801,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 13.70 | $108,029 | 20 | 10.910 | $1,178,586 |
| | Sed. Basin O&M | Flow Rate (mgd) | 13.70 | $1,541 | 50 | 14.484 | $22,323 |
| | Screening O&M | Flow Rate (mgd) | 13.70 | $8,605 | 20 | 10.910 | $93,885 |
| | Disinfection O&M | Flow Rate (mgd) | 13.70 | $79,211 | 20 | 10.910 | $864,182 |
| | Odor Control O&M | Capacity (cfm) | 2,100.00 | $7,350 | 20 | 10.910 | $80,188 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,541 |
| | | | **Total Annual O&M** | **$205,000** | | **Total PW O&M** | **$2,258,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 15.07 | $115,131 | 20 | 10.910 | $1,256,076 |
| | HREP O&M | Flow Rate (mgd) | 13.70 | $108,572 | 20 | 10.910 | $1,184,516 |
| | Screening O&M | Flow Rate (mgd) | 13.70 | $8,605 | 20 | 10.910 | $93,885 |
| | Disinfection O&M | Flow Rate (mgd) | 15.07 | $83,946 | 20 | 10.910 | $915,845 |
| | Odor Control O&M | Capacity (cfm) | 250.00 | $875 | 20 | 10.910 | $9,546 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $28,065 |
| | | | **Total Annual O&M** | **$318,000** | | **Total PW O&M** | **$3,488,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 15.07 | $115,131 | 20 | 10.910 | $1,256,076 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 13.70 | $1,541 | 20 | 10.910 | $16,815 |
| | Screening O&M | Flow Rate (mgd) | 13.70 | $8,605 | 20 | 10.910 | $93,885 |
| | Disinfection O&M | Flow Rate (mgd) | 15.07 | $83,946 | 20 | 10.910 | $915,845 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,850 |
| | | | **Total Annual O&M** | **$210,000** | | **Total PW O&M** | **$2,301,000** |

| ACSO 006AS46 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 13.70 | $108,029 | 20 | 10.910 | $1,178,586 |
| | Screening O&M | Flow Rate (mgd) | 13.70 | $8,605 | 20 | 10.910 | $93,885 |
| | Disinfection O&M | Flow Rate (mgd) | 13.70 | $79,211 | 20 | 10.910 | $864,182 |
| | Odor Control O&M | Capacity (cfm) | 210.00 | $735 | 20 | 10.910 | $8,019 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,168 |
| | | | **Total Annual O&M** | **$197,000** | | **Total PW O&M** | **$2,163,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $20.4 | $20,407,000 | $0 |
| 1 | $20.4 | $20,407,000 | $0 |
| 2 | $20.4 | $20,407,000 | $0 |
| 4 | $20.4 | $20,407,000 | $0 |
| 6 | $20.4 | $20,407,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $82.5 | $70,164,000 | $12,363,000 |
| 1 | $6.6 | $5,623,000 | $1,009,000 |
| 2 | $6.5 | $5,503,000 | $1,006,000 |
| 4 | $5.0 | $4,136,000 | $838,000 |
| 6 | $4.6 | $3,762,000 | $801,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $35.6 | $31,422,000 | $4,195,000 |
| 1 | $10.0 | $7,551,000 | $2,495,000 |
| 2 | $9.5 | $7,130,000 | $2,376,000 |
| 4 | $7.4 | $5,446,000 | $1,917,000 |
| 6 | $6.6 | $4,829,000 | $1,729,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $15.8 | $11,759,000 | $4,006,000 |
| 1 | $12.2 | $8,560,000 | $3,615,000 |
| 2 | $11.5 | $8,054,000 | $3,407,000 |
| 4 | $8.9 | $6,298,000 | $2,629,000 |
| 6 | $7.9 | $5,610,000 | $2,301,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $21.3 | $15,637,000 | $5,661,000 |
| 1 | $20.3 | $14,836,000 | $5,416,000 |
| 2 | $19.0 | $13,886,000 | $5,114,000 |
| 4 | $14.5 | $10,570,000 | $3,972,000 |
| 6 | $12.8 | $9,295,000 | $3,488,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $28.7 | $24,948,000 | $3,759,000 |
| 1 | $28.1 | $24,536,000 | $3,584,000 |
| 2 | $27.4 | $24,050,000 | $3,376,000 |
| 4 | $24.9 | $22,356,000 | $2,590,000 |
| 6 | $23.9 | $21,688,000 | $2,258,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.7 | $9,157,000 | $3,547,000 |
| 1 | $12.1 | $8,719,000 | $3,391,000 |
| 2 | $11.4 | $8,206,000 | $3,197,000 |
| 4 | $8.9 | $6,402,000 | $2,469,000 |
| 6 | $7.9 | $5,701,000 | $2,163,000 |

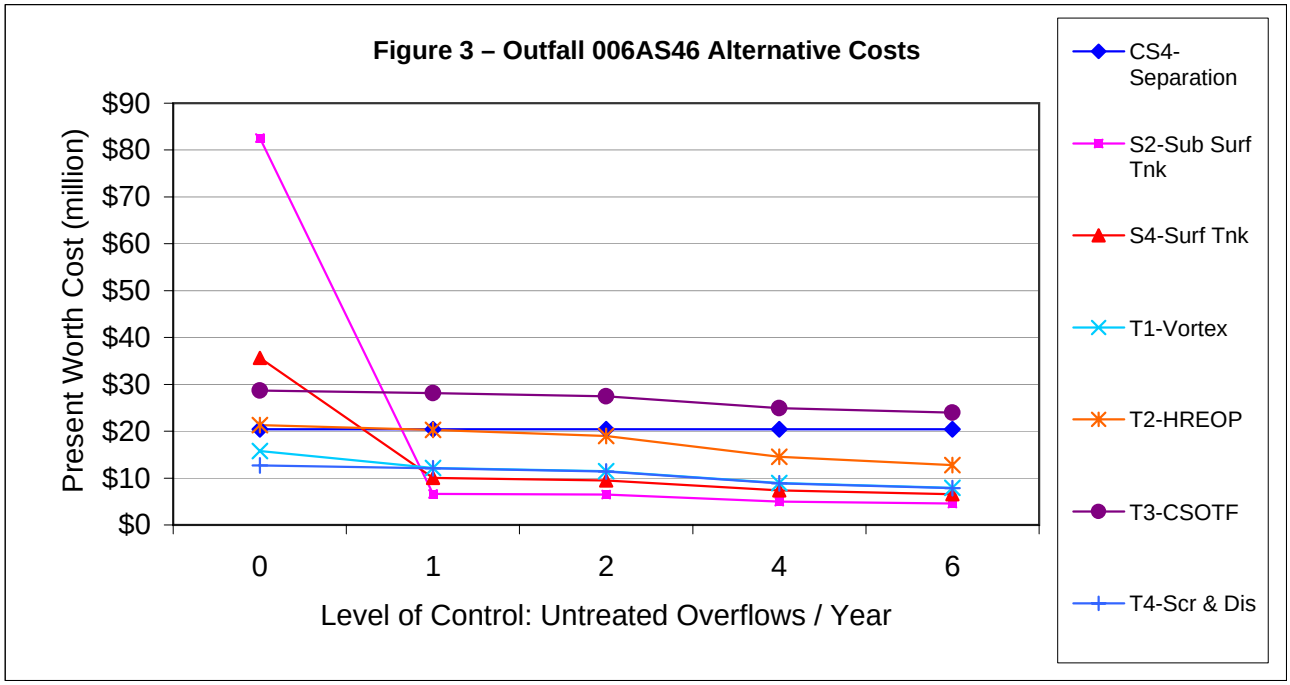
Figure 3 – Outfall 006AS46 Alternative Costs
Present Worth Cost (million)
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 006AS46 |
| **Location Name** | S-46 |
| **Model ID** | ADC 019DS46-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 006AS46 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 47 | |
| Peak Volume: | 2,457,194 | $ft^3$ |
| | 18.38 | MG |
| Total Volume: | 3,106,635 | $ft^3$ |
| | 23.24 | MG |
| Peak Rate: | 46.58 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 2:05 | 3629 | 1/6/2005 3:30 | 2457194.39 | 18381.043 | 0 | 21.20 | 6 |
| 8/20/2005 18:15 | 79 | 8/20/2005 19:00 | 72490.84 | 542.268 | 1 | 39.52 | 2 |
| 6/11/2005 17:30 | 46 | 6/11/2005 17:45 | 72298.15 | 540.826 | 2 | 46.58 | 0 |
| 7/5/2005 16:15 | 80 | 7/5/2005 16:30 | 47360.50 | 354.280 | 3 | 26.21 | 4 |
| 5/13/2005 22:40 | 130 | 5/13/2005 23:45 | 43873.75 | 328.198 | 4 | 12.10 | 12 |
| 11/14/2005 21:51 | 379 | 11/15/2005 3:45 | 40429.65 | 302.434 | 5 | 14.50 | 9 |
| 5/14/2005 16:00 | 65 | 5/14/2005 16:15 | 37939.60 | 283.807 | 6 | 43.37 | 1 |
| 7/26/2005 19:45 | 45 | 7/26/2005 20:00 | 30978.63 | 231.736 | 7 | 25.59 | 5 |
| 1/14/2005 0:10 | 189 | 1/14/2005 2:15 | 27432.73 | 205.211 | 8 | 6.84 | 21 |
| 9/29/2005 5:20 | 40 | 9/29/2005 5:45 | 27379.96 | 204.816 | 9 | 26.44 | 3 |
| 7/15/2005 17:40 | 56 | 7/15/2005 18:00 | 25123.52 | 187.937 | 10 | 12.19 | 11 |
| 1/8/2005 4:45 | 99 | 1/8/2005 5:15 | 22829.60 | 170.777 | 11 | 7.50 | 19 |
| 11/9/2005 19:20 | 35 | 11/9/2005 19:45 | 21971.71 | 164.359 | 12 | 17.15 | 8 |
| 11/29/2005 6:40 | 325 | 11/29/2005 7:00 | 18777.47 | 140.465 | 13 | 4.35 | 25 |
| 7/21/2005 14:25 | 34 | 7/21/2005 14:45 | 18512.06 | 138.479 | 14 | 18.73 | 7 |
| 1/11/2005 8:45 | 561 | 1/11/2005 11:30 | 16229.90 | 121.408 | 15 | 3.06 | 32 |
| 7/12/2005 19:35 | 45 | 7/12/2005 20:00 | 13858.16 | 103.666 | 16 | 11.95 | 13 |
| 1/12/2005 0:50 | 164 | 1/12/2005 1:30 | 12900.25 | 96.500 | 17 | 6.82 | 22 |
| 4/23/2005 3:35 | 70 | 4/23/2005 4:00 | 9974.28 | 74.613 | 18 | 3.84 | 27 |
| 3/28/2005 9:45 | 571 | 3/28/2005 19:00 | 8688.90 | 64.997 | 19 | 3.94 | 26 |
| 5/11/2005 22:35 | 90 | 5/11/2005 22:45 | 8639.39 | 64.627 | 20 | 7.62 | 17 |
| 4/2/2005 6:00 | 243 | 4/2/2005 6:30 | 7709.44 | 57.670 | 21 | 2.27 | 34 |
| 7/25/2005 13:15 | 25 | 7/25/2005 13:30 | 7624.81 | 57.037 | 22 | 12.55 | 10 |
| 5/23/2005 16:20 | 30 | 5/23/2005 16:30 | 6625.82 | 49.564 | 23 | 7.74 | 16 |
| 8/27/2005 15:20 | 20 | 8/27/2005 15:30 | 6101.48 | 45.642 | 24 | 11.24 | 14 |
| 7/17/2005 16:15 | 25 | 7/17/2005 16:30 | 5708.39 | 42.702 | 25 | 6.90 | 20 |
| 2/9/2005 16:30 | 25 | 2/9/2005 16:45 | 5417.83 | 40.528 | 26 | 6.73 | 23 |
| 8/29/2005 9:20 | 272 | 8/29/2005 13:45 | 5192.82 | 38.845 | 27 | 5.40 | 24 |
| 11/16/2005 4:05 | 20 | 11/16/2005 4:15 | 4542.54 | 33.980 | 28 | 8.57 | 15 |
| 5/28/2005 8:45 | 50 | 5/28/2005 9:15 | 4340.03 | 32.466 | 29 | 2.47 | 33 |
| 2/20/2005 19:45 | 50 | 2/20/2005 20:00 | 4057.95 | 30.356 | 30 | 3.35 | 29 |
| 1/3/2005 13:08 | 437 | 1/3/2005 13:45 | 3051.39 | 22.826 | 31 | 1.36 | 35 |
| 12/15/2005 13:45 | 24 | 12/15/2005 14:00 | 2605.29 | 19.489 | 32 | 3.77 | 28 |



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Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 6/28/2005 18:05 | 18 | 6/28/2005 18:15 | 2598.09 | 19.435 | 33 | 7.56 | 18 |
| 11/9/2005 4:20 | 15 | 11/9/2005 4:30 | 1447.80 | 10.830 | 34 | 3.09 | 31 |
| 8/26/2005 20:55 | 14 | 8/26/2005 21:00 | 1033.72 | 7.733 | 35 | 3.19 | 30 |
| 9/26/2005 7:50 | 119 | 9/26/2005 8:00 | 693.74 | 5.190 | 36 | 1.23 | 37 |
| 5/7/2005 13:20 | 15 | 5/7/2005 13:30 | 580.84 | 4.345 | 37 | 1.28 | 36 |
| 10/25/2005 2:05 | 27 | 10/25/2005 2:15 | 550.97 | 4.122 | 38 | 0.77 | 39 |
| 10/7/2005 10:30 | 24 | 10/7/2005 10:45 | 520.46 | 3.893 | 39 | 0.68 | 40 |
| 3/24/2005 9:40 | 10 | 3/24/2005 9:45 | 333.47 | 2.494 | 40 | 1.11 | 38 |
| 10/21/2005 19:05 | 15 | 10/21/2005 19:15 | 262.05 | 1.960 | 41 | 0.49 | 42 |
| 2/14/2005 14:35 | 22 | 2/14/2005 14:45 | 225.88 | 1.690 | 42 | 0.35 | 44 |
| 10/22/2005 6:55 | 10 | 10/22/2005 7:00 | 183.02 | 1.369 | 43 | 0.61 | 41 |
| 3/23/2005 12:16 | 18 | 3/23/2005 12:30 | 145.72 | 1.090 | 44 | 0.24 | 46 |
| 5/28/2005 17:25 | 9 | 5/28/2005 17:30 | 112.22 | 0.839 | 45 | 0.37 | 43 |
| 4/22/2005 16:10 | 9 | 4/22/2005 16:15 | 86.26 | 0.645 | 46 | 0.29 | 45 |

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# Region 1

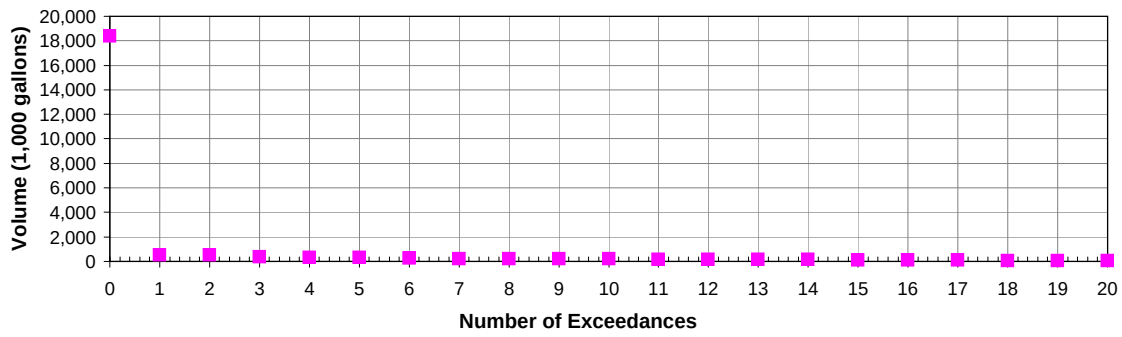
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 006AS46 |
| **Location Name** | S-46 |
| **Model ID** | ADC 019DS46-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 006AS46 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

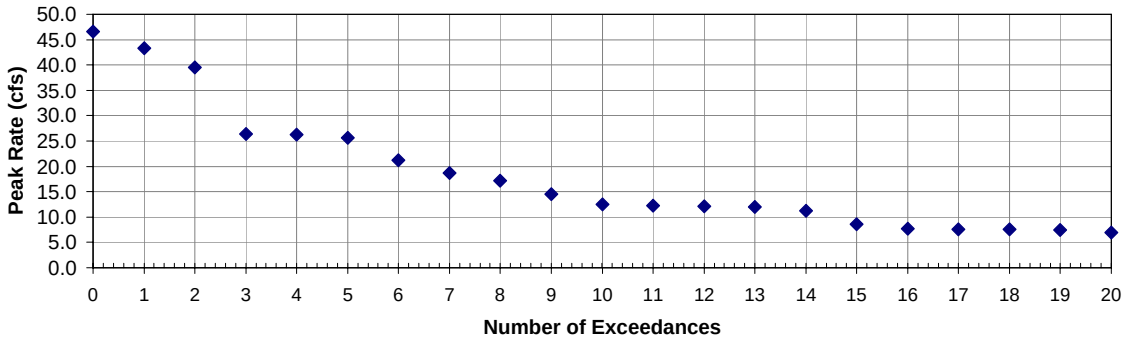
**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 47 | |
| Peak Volume: | 2,457,194 | $ft^3$ |
| | 18.38 | MG |
| Total Volume: | 3,106,635 | $ft^3$ |
| | 23.24 | MG |
| Peak Rate: | 46.58 | cfs |

### Figure 1 - Outfall 006AS46 CSO Volume




### Figure 2 - Outfall 006AS46 CSO Peak Flow Rate



## D.26.2 S-46 – 006AS46 - SAW MILL RUN INTERCEPTOR SEWERSHED – NPDES# 006AS46

### Description of Outfall

Outfall 006AS46 conveys overflows from the ALCOSAN diversion chamber S-46 to Saw Mill Run. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, and West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run near the intersection of Main Street and Sanctus Street in the West End section of the City of Pittsburgh. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 006AS46 (S-46) Sewershed consists of 135 acres, or approximately 2.9% of the total service area. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 006AS46 typically experiences 47 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 006AS46 is approximately 18.38 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 006AS46 is approximately 46.58 CFS. *Figure 1 – Outfall 006AS46 CSO Volume* and *Figure 2 – Outfall 006AS46 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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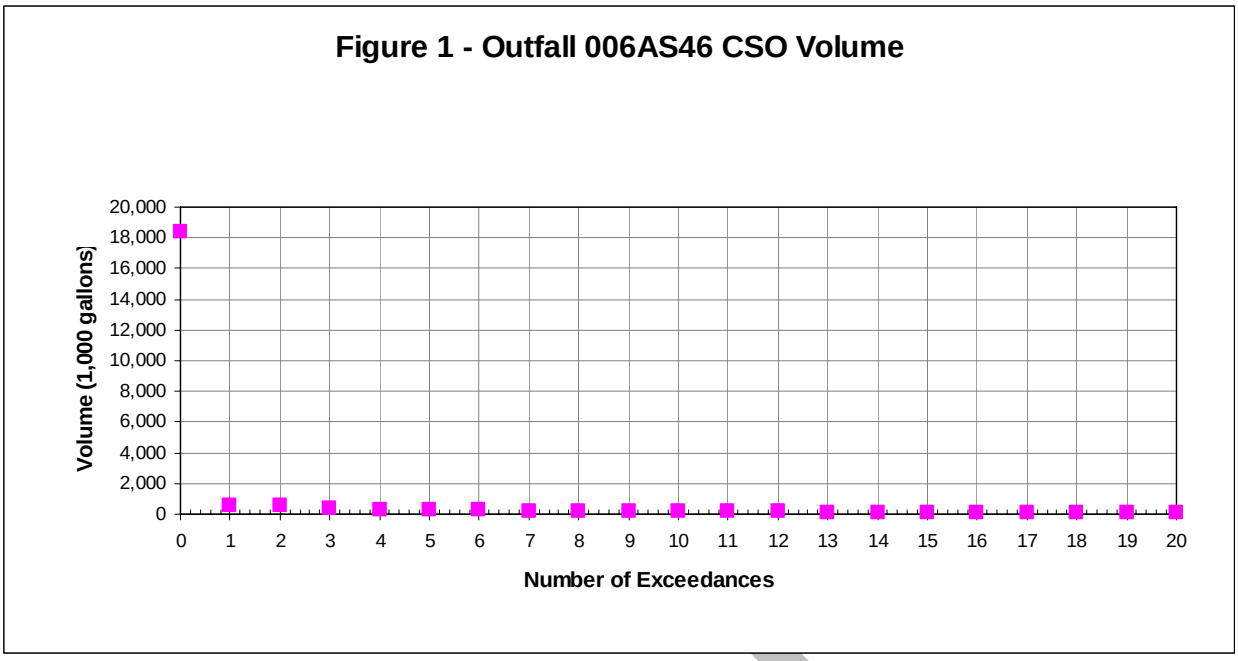


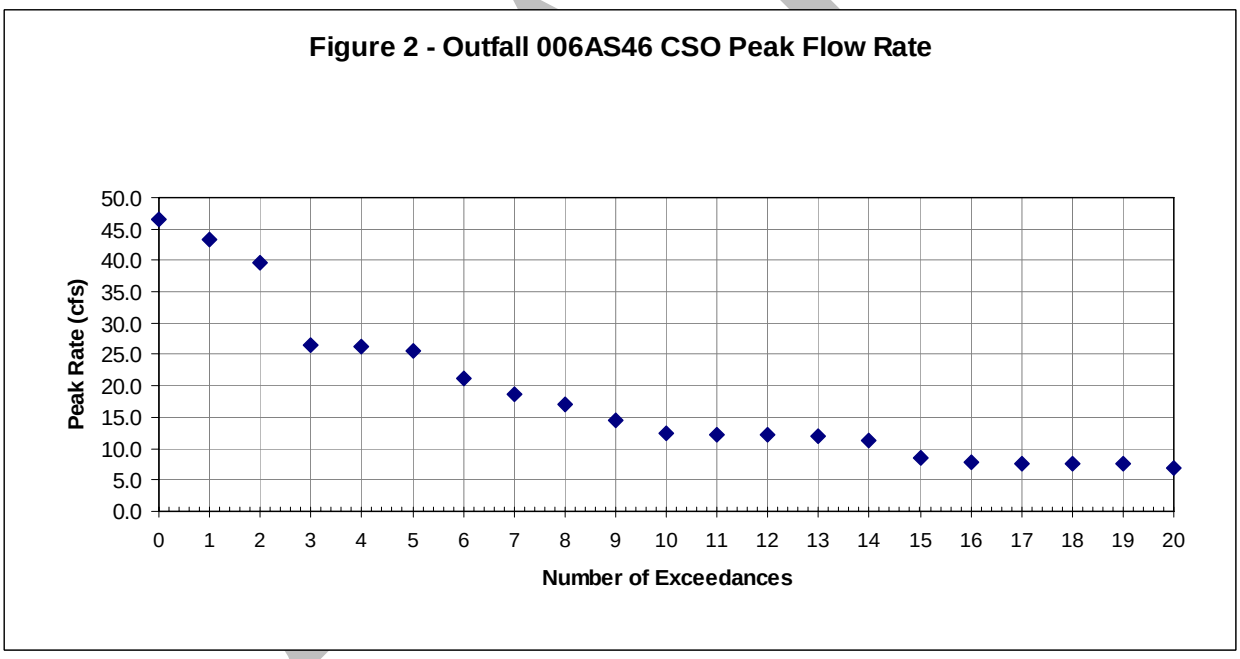


There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 006AS46, in an existing parking lot near the intersection of Main Street and Saw Mill Run. The site is generally bounded by Saw Mill Run to the west, Main Street to the south and private development to the north and west.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 006AS46. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-006AS46: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-006AS46: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-006AS46: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-006AS46: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-006AS46: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-006AS46: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-006AS46: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

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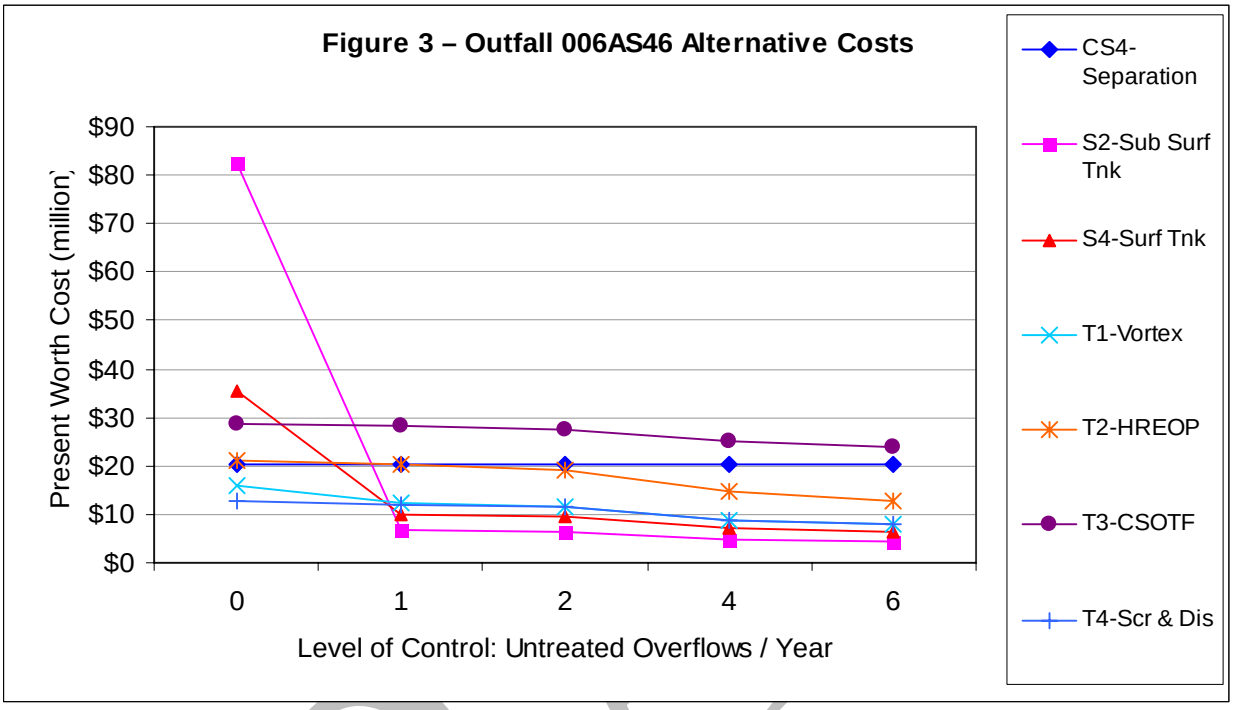
*Figure 3 – Outfall 006AS46 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control level 0, it is recommended that Alternative T4-006AS46: Screening and Disinfection be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control levels 1 through 6, it is recommended that Alternative S2-006AS46: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.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*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Although separation reduces hydraulic loading, additional pollutants may be introduced to the receiving stream. Stormwater flows that would have originally ended up in the trunk sewer will now discharge directly to local waterways. Discharge constituents include surface pollutants such as oil, grease and road grit, as well as general trash and road debris. Another issue to consider with separation is the available regulator capacity at the ALCOSAN diversion chamber. Sufficient capacity must exist in order to convey the sanitary flow to the interceptor. Failure to provide sufficient capacity may result in a sanitary sewer overflow (SSO) condition.

Space is limited for a sub-surface storage facility. An alternative site is located east of this area, across Saw Mill Run that may be viable for construction of the facility.

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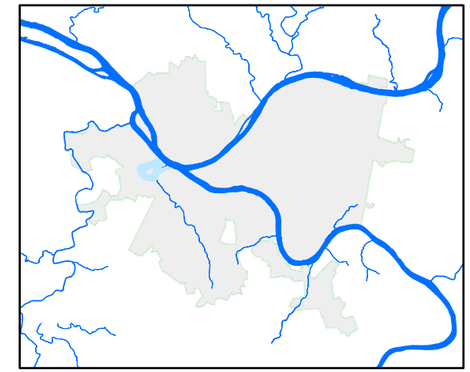

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

# Attachment 1
# S-46
# Tributary Area Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0208.pdf

# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 135 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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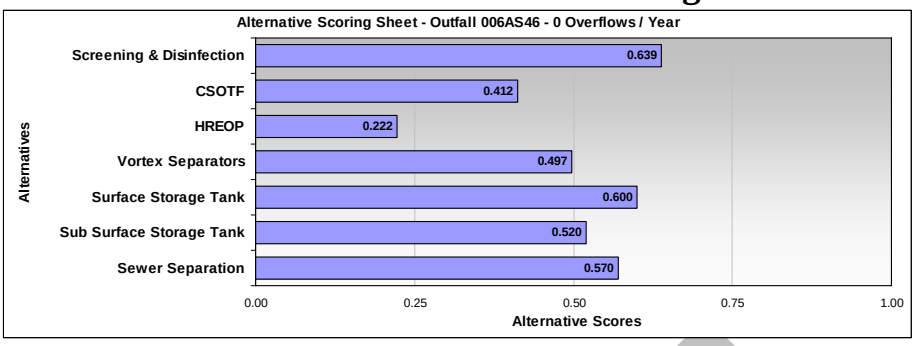
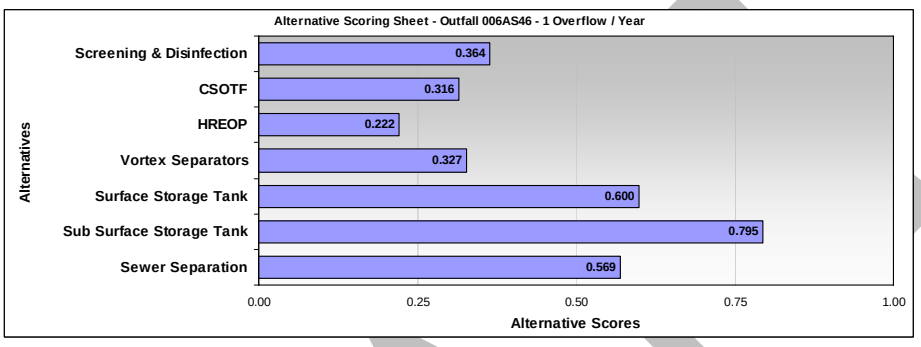
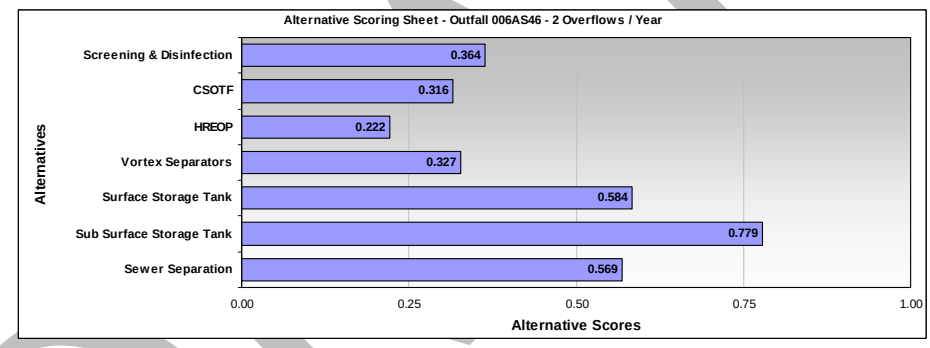
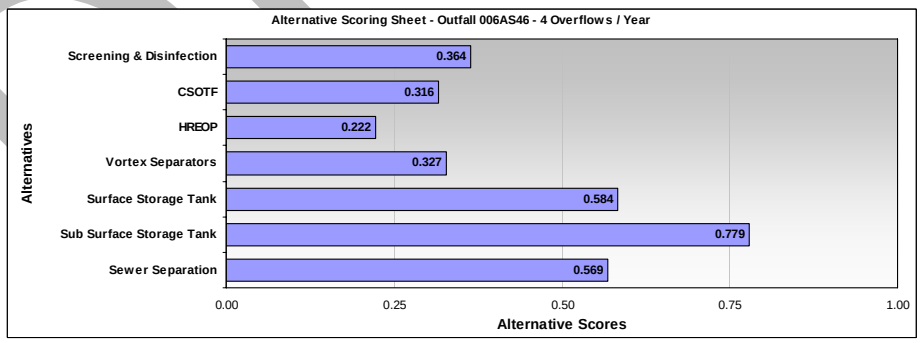
SW-D-0208.pdf

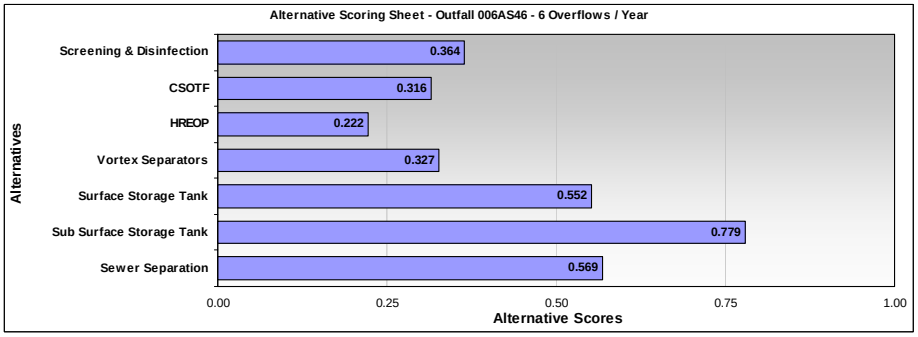
# Attachment 3 – Alternative Scoring Sheet





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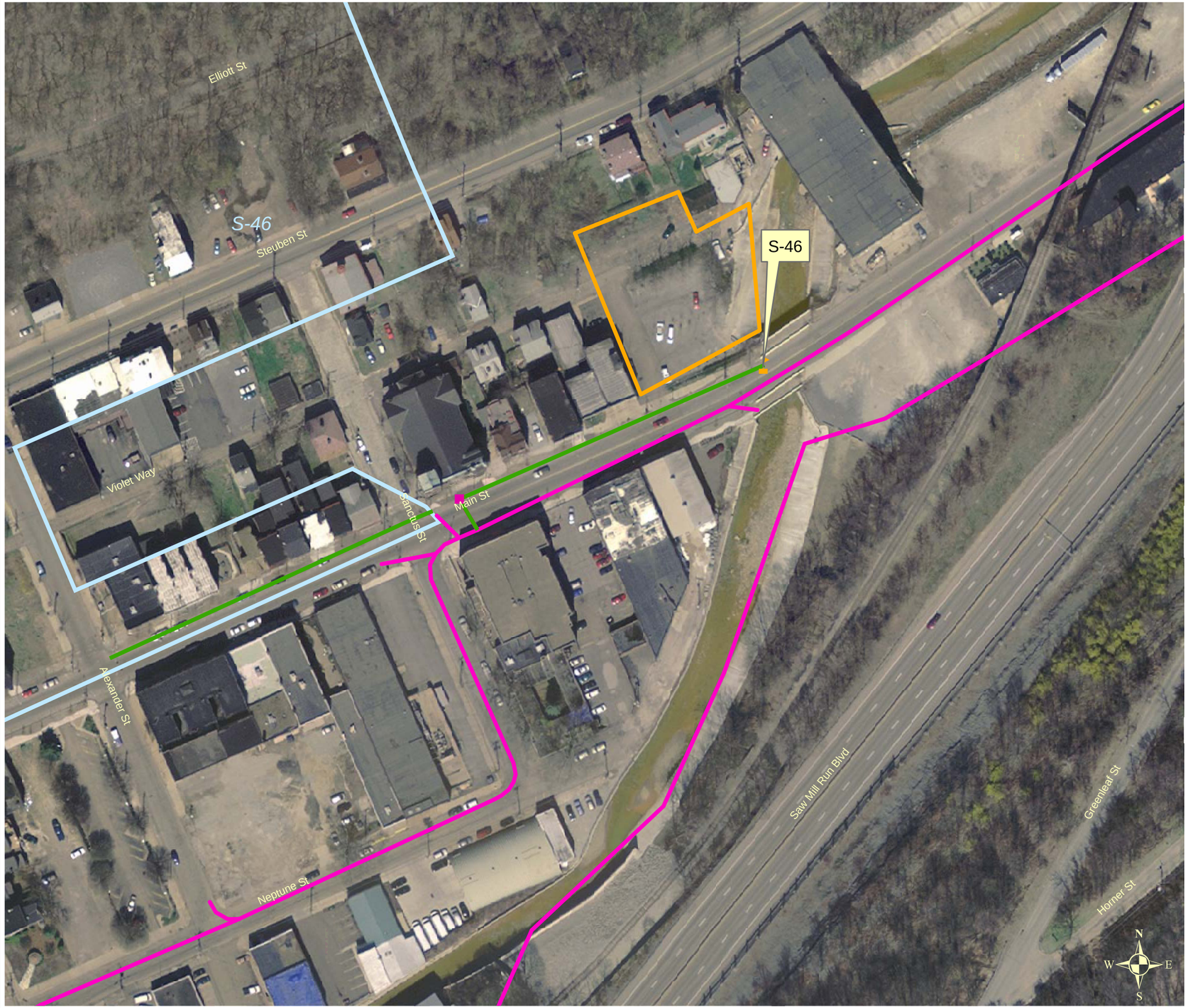
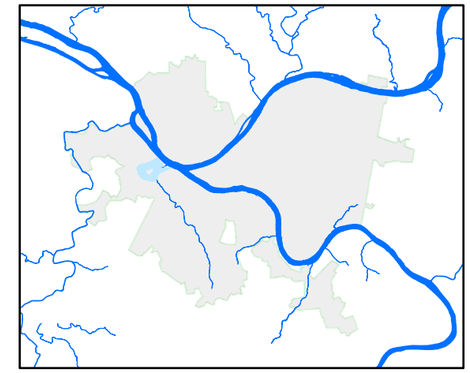


Area Overview

## Legend

- Sewershed Boundary
- Combined Sewer Outfall
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# S-46
# Facilities Boundary Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0208.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 2 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 3 | 4 | 5 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 4 | 4 | 3 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 2 | #N/A |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 2 | #N/A |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.668** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.669** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.674** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.694** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.699** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

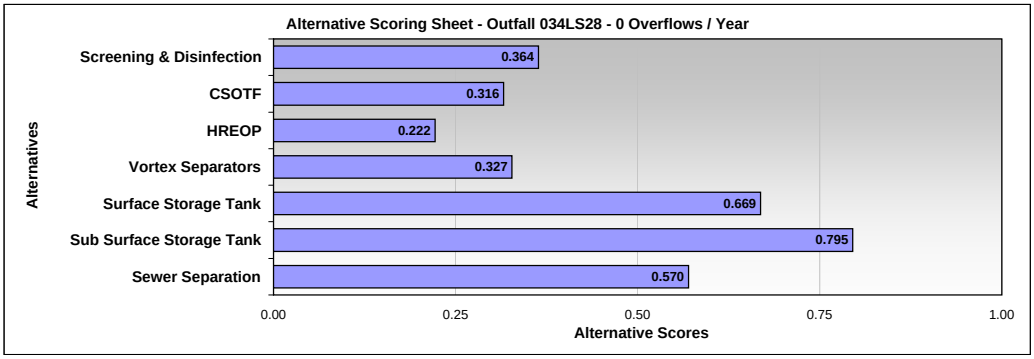
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

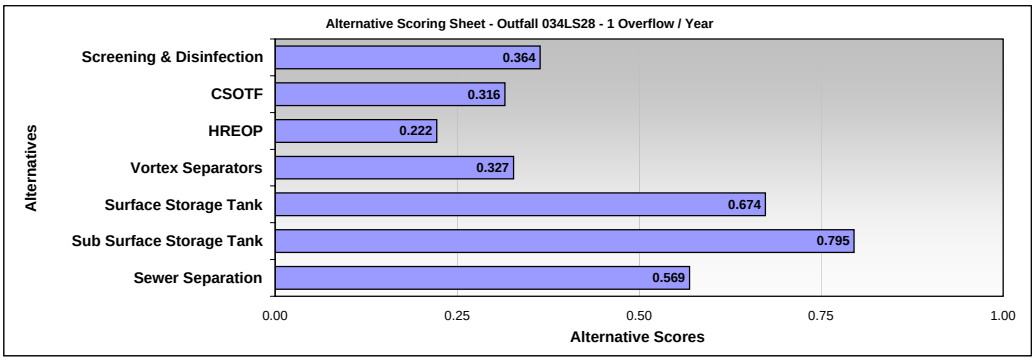
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

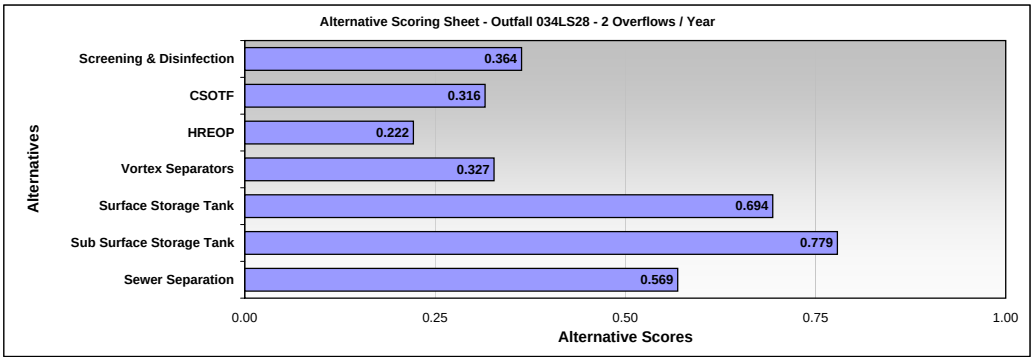
Total Score

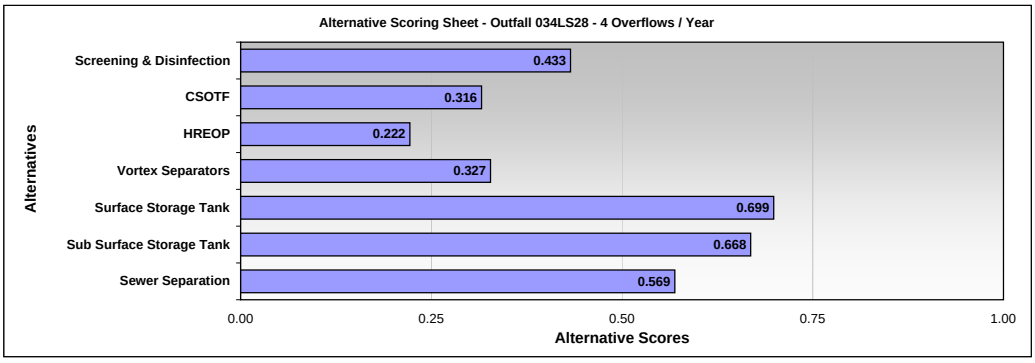
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.433** |

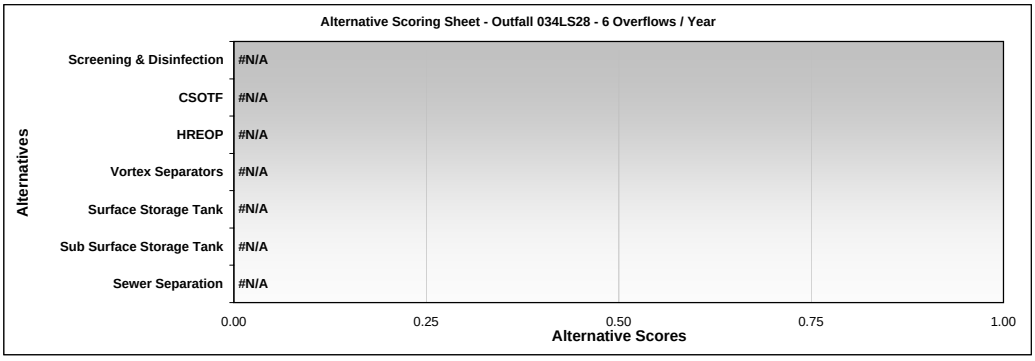
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | #N/A | #N/A | 0.147 | #N/A |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | #N/A | #N/A | 0.128 | #N/A |
| | | | **Sum Total:** | **#N/A** |


Alternative Scoring Sheet - Outfall 034LS28 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.669
0.795
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034LS28 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.674
0.795
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034LS28 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.694
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034LS28 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.433
0.316
0.222
0.327
0.699
0.668
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 034LS28 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
#N/A
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 40 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **6,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 17,424 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **35,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 6,074,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.03 | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.03 | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 23 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 16 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.04 | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | | 0 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **19,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 2.41 | 3.73 | = Peak Rate |
| Force Main Diameter (In) | | 11 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,783,000** | **$ 20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.73 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 40 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 2.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,495,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.03 | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.03 | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 23 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 16 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.04 | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | | 0 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **998,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.03 | 0.04 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 1 | | Input by Engineer |
| Force Main Velocity (FPS) | | 7.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **308,000** | **$ 12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.73 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,029,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.41 | | 3.73 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **517,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 2.65 | | 4.10 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,825,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.73 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 2.41 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 2.65 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | |
| Passes / Detention (Min) | | 3 | | 16.48 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **394,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,770,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 0 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.41 | 3.73 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.41 | 3.73 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,783,000** | **$ 20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.73 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.41 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | 12 | |
| Passes / Detention (Min) | | 3 | **16.09** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **389,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,277,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.41 | | 3.73 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,578,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.65 | | 4.10 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,825,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.73 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.41 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.65 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **16.48** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 394,000 | $ | 227,000 | |
| **Construction Cost (Disinfection)** | **$** | **621,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,725,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 3,634 | CF |
| | 0.03 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 3.73 | CFS |
| | 2.41 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.41 | | 3.73 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **524,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.41 | | 3.73 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,783,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.73 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.41 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | |
| Passes / Detention (Min) | | 3 | | **16.09** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 389,000 | $ | 218,000 | |
| **Construction Cost (Disinfection)** | **$** | **607,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **3,089,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 40 | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **6,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 17,424 | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **35,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **6,074,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **9,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 1.58 | | 2.44 | = Peak Rate |
| Force Main Diameter (In) | 9 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,632,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 2.44 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 20 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **4,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 1.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **485,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,289,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **956,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.01 | | 0.02 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **296,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 2.44 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **21,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 1.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **485,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,910,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 1 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.58 | 2.44 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.74 | 2.69 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,661,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.44 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **485,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.74 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | 10 | |
| Passes | | 3 | **16.37** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **374,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 2,905,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.58 | 2.44 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 300 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 25 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 13 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.03 | 3,900 | |
| **Construction Cost (CSOTF)** | **$** | **16,397,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.58 | 2.44 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.5 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,632,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 2.44 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 300 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **36,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **485,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.58 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 21 | 10 | |
| Passes | | 3 | **17.19** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **371,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **19,054,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.58 | | 2.44 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 20 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 7 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,448,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.74 | | 2.69 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 9 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,661,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.44 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 1.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **485,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 1.74 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 22 | | 10 | Input by Engineer |
| Passes | | 3 | | **16.37** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 374,000 | $ | 196,000 | |
| **Construction Cost (Disinfection)** | **$** | **570,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,338,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 1,829 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 2.44 | CFS |
| | 1.58 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 1.58 | | 2.44 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **485,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 1.58 | | 2.44 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 9 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,632,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 2.44 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 1.58 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 21 | | 10 | |
| Passes | | 3 | | **17.19** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 371,000 | $ | 192,000 | |
| **Construction Cost (Disinfection)** | **$** | **563,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,853,000** | | | |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 40 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **6,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 17,424 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **35,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **6,074,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 1,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.01 | | 1,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 11 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 8 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.01 | | 1,320 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **7,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 1.19 | | 1.83 | = Peak Rate |
| Force Main Diameter (In) | 7 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,292,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 2,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 10 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **2,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 1.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **467,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,925,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 1,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.01 | | 1,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 11 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 8 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.01 | | 1,320 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **948,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.01 | | 0.02 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **294,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 2,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **15,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 1.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **467,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,876,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.19 | | 1.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.30 | | 2.02 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 8 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,393,000** | **$** | **18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **467,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.30 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 19 | | 9 | |
| Passes | | 3 | | **16.95** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **365,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 1,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **2,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **2,607,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.19 | 1.83 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 200 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 21 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 11 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.02 | 2,772 | |
| **Construction Cost (CSOTF)** | **$** | **16,398,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.19 | 1.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 7 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,292,000** | **$ 17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 1.83 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 200 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 1.19 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **467,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 1.19 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 18 | 9 | |
| Passes | | 3 | **17.67** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **363,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 5,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **18,675,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 1.19 | | 1.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 20 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 7 | | OK | Input by Engineer |
| Width (Ft) | | 4 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,386,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 1.30 | | 2.02 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 8 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,393,000** | **$** | **18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 1.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **467,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 1.30 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 19 | | 9 | Input by Engineer |
| Passes | | 3 | | 16.95 | Input by Engineer / 12' SWD Basis |
| | | | | OK Detn Time | |
| Construction Cost (Disinfection / CC Tank) | $ | 365,000 | $ | 179,000 | |
| **Construction Cost (Disinfection)** | **$** | **544,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,963,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 1,452 | CF |
| | 0.01 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 1.83 | CFS |
| | 1.19 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 1.19 | | 1.83 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **467,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 1.19 | | 1.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 7 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,292,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.83 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 400 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 20 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **4,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 1.19 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 18 | | 9 | |
| Passes | | 3 | | **17.67** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 363,000 | $ | 175,000 | |
| **Construction Cost (Disinfection)** | **$** | **538,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,466,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 40 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **6,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 17,424 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **35,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **6,074,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.00 | - | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.00 | 0 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 1 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 1 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.00 | 15 | **Insufficient Volume** |
| Tank Area (SF) | | 0 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **2,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 0.43 | 0.67 | = Peak Rate |
| Force Main Diameter (In) | | 5 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 4.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **652,000** | **$ 15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 0.67 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 0.43 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **432,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 19,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **38,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **1,241,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.00 | | - | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.00 | | 0 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 1 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 1 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.00 | | 15 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **923,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.00 | | 0.00 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 0 | | | Input by Engineer |
| Force Main Velocity (FPS) | 0.0 | | **Check:** | **No Main Req'd** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **287,000** | **$** | **11,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 0.67 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 0 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **-** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 0.43 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **432,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,793,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 4 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.43 | 0.67 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.48 | 0.74 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 5 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.4 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **689,000** | **$ 15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 0.67 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.43 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **432,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.48 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 12 | 6 | |
| Passes | | 3 | **19.56** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **347,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 0 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | **TOTAL CAPITAL COST** | **$** | **1,845,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.43 | 0.67 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 15 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 8 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.01 | 1,440 | |
| **Construction Cost (CSOTF)** | **$** | **16,399,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.43 | 0.67 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 5 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 4.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **652,000** | **$ 15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 0.67 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.43 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **432,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.43 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 11 | 6 | |
| Passes | | 3 | **19.72** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **347,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 5,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **17,972,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.43 | | 0.67 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 10 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 5 | | **OK** | Input by Engineer |
| Width (Ft) | | 3 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,269,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.48 | | 0.74 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 5 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **689,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 0.67 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 0.43 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **432,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 0.48 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 12 | | 6 | Input by Engineer |
| Passes | | 3 | | **19.56** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 347,000 | $ | 141,000 | |
| **Construction Cost (Disinfection)** | **$** | **488,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,039,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 5 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 392 | CF |
| | 0.00293 | MG |
| Total Volume | 8,383 | CF |
| | 0.06 | MG |
| Peak Rate | 0.67 | CFS |
| | 0.43 | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 0.43 | | 0.67 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **432,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 0.43 | | 0.67 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 5 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 4.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **652,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 0.67 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 10 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 0.43 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 11 | | 6 | |
| Passes | | 3 | | **19.72** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 347,000 | $ | 137,000 | |
| **Construction Cost (Disinfection)** | **$** | **484,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 22,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **1,731,000** | | | |

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 40 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **6,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 17,424 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **35,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **6,074,000** |

Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | #N/A | #N/A | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | #N/A | #N/A | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | #N/A | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | #N/A | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | #N/A | #N/A | **#N/A** |
| Tank Area (SF) | | #N/A | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **#N/A** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Rate |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | #N/A | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | #N/A | #N/A | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | #N/A | #N/A | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | #N/A | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | #N/A | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | #N/A | #N/A | **#N/A** |
| Tank Area (SF) | | #N/A | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | #N/A | | Input by Engineer |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | #N/A | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | #N/A | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | #N/A | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | #N/A | **#N/A** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | #N/A | **#N/A** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **#N/A** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | #N/A | #N/A | |
| **Construction Cost (CSOTF)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: CSO Statistics |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | #N/A | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

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| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | |
| 6 Overflows / Year | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | #N/A | #N/A | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | #N/A | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | #N/A | **#N/A** | Input by Engineer |
| Width (Ft) | | #N/A | **#N/A** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **#N/A** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Input by Engineer |
| **Construction Cost (HREOP)** | | **#N/A** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | #N/A | | Input by Engineer |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: Technical Parameters |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Input by Engineer |
| Peak Flow, into facility (MGD) | | #N/A | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Input by Engineer |
| Peak Flow (MGD) | | #N/A | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | Input by Engineer |
| Passes | | #N/A | **#N/A** | Input by Engineer / 12' SWD Basis |
| | | | **#N/A** | |
| Construction Cost (Disinfection / CC Tank) | #N/A | | #N/A | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | | #N/A | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

Capital Costs

| RESULTS SUMMARY | | | |
|---|---|---|---|
| Number of Events / Year | | 5 | |
| Number of Overflows / Year | | 6 | |
| Peak Volume | #N/A | | CF |
| | | #N/A | MG |
| Total Volume | | 8,383 | CF |
| | | 0.06 | MG |
| Peak Rate | #N/A | | CFS |
| | #N/A | | MGD |

| Capital Costs - 034LS28 / Sewershed ACSO 034LS28 | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow, into facility (MGD) | | #N/A | #N/A | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **#N/A** | | | **#N/A** |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | #N/A | #N/A | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | #N/A | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | #N/A | **Check:** | **#N/A** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **#N/A** | | **#N/A** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | #N/A | | Ref: CSO Statistics |
| Diameter (In) | | #N/A | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **#N/A** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | #N/A | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | #N/A | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **#N/A** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow (MGD) | | #N/A | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | #N/A | #N/A | |
| Passes | | #N/A | **#N/A** | Ref: Tech Param-15 min minimum |
| | | | **#N/A** | |
| Construction Cost (Disinfection / CC Tank) | #N/A | | #N/A | |
| **Construction Cost (Disinfection)** | **#N/A** | | | |
| **6. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | | #N/A | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **#N/A** | | | |
| | | **TOTAL CAPITAL COST** | | **#N/A** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.41 | $33,833 | 20 | 10.910 | $369,113 |
| | Tank O&M | No. Events / Yr | 5 | $3,120 | 50 | 14.484 | $45,182 |
| | | Const Cost ($) | $19,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,636 | 20 | 10.910 | $83,312 |
| | Odor Control O&M | Capacity (cfm) | 40 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,719 |
| | | | **Total Annual O&M** | **$45,000** | | **Total PW O&M** | **$508,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.03 | $1,691 | 20 | 10.910 | $18,446 |
| | Tank O&M | No. Events / Yr | 5 | $5,567 | 50 | 14.484 | $80,630 |
| | | Const Cost ($) | $998,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,636 | 20 | 10.910 | $83,312 |
| | Odor Control O&M | Capacity (cfm) | 400 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,804 |
| | | | **Total Annual O&M** | **$17,000** | | **Total PW O&M** | **$200,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.41 | $33,833 | 20 | 10.910 | $369,113 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.41 | $271 | 50 | 14.484 | $3,927 |
| | Screening O&M | Flow Rate (mgd) | 2.41 | $7,636 | 20 | 10.910 | $83,312 |
| | Disinfection O&M | Flow Rate (mgd) | 2.41 | $27,481 | 20 | 10.910 | $299,816 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,902 |
| | | | **Total Annual O&M** | **$71,000** | | **Total PW O&M** | **$785,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.65 | $36,057 | 20 | 10.910 | $393,382 |
| | HREP O&M | Flow Rate (mgd) | 2.41 | $39,074 | 20 | 10.910 | $426,298 |
| | Screening O&M | Flow Rate (mgd) | 2.41 | $7,636 | 20 | 10.910 | $83,312 |
| | Disinfection O&M | Flow Rate (mgd) | 2.65 | $29,124 | 20 | 10.910 | $317,739 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,260 |
| | | | **Total Annual O&M** | **$113,000** | | **Total PW O&M** | **$1,237,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.65 | $36,057 | 20 | 10.910 | $393,382 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.41 | $271 | 20 | 10.910 | $2,958 |
| | Screening O&M | Flow Rate (mgd) | 2.41 | $7,636 | 20 | 10.910 | $83,312 |
| | Disinfection O&M | Flow Rate (mgd) | 2.65 | $29,124 | 20 | 10.910 | $317,739 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,978 |
| | | | **Total Annual O&M** | **$79,000** | | **Total PW O&M** | **$864,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.41 | $33,833 | 20 | 10.910 | $369,113 |
| | Screening O&M | Flow Rate (mgd) | 2.41 | $7,636 | 20 | 10.910 | $83,312 |
| | Disinfection O&M | Flow Rate (mgd) | 2.41 | $27,481 | 20 | 10.910 | $299,816 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,777 |
| | | | **Total Annual O&M** | **$70,000** | | **Total PW O&M** | **$764,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.58 | $25,505 | 20 | 10.910 | $278,256 |
| | Tank O&M | No. Events / Yr | 5 | $3,095 | 50 | 14.484 | $44,819 |
| | | Const Cost ($) | $9,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,567 | 20 | 10.910 | $82,554 |
| | Odor Control O&M | Capacity (cfm) | 20 | $70 | 20 | 10.910 | $764 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,989 |
| | | | **Total Annual O&M** | **$37,000** | | **Total PW O&M** | **$414,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.01 | $1,068 | 20 | 10.910 | $11,657 |
| | Tank O&M | No. Events / Yr | 5 | $5,462 | 50 | 14.484 | $79,109 |
| | | Const Cost ($) | $956,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,567 | 20 | 10.910 | $82,554 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,584 |
| | | | **Total Annual O&M** | **$15,000** | | **Total PW O&M** | **$182,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 1.58 | $25,505 | 20 | 10.910 | $278,256 |
| | Sed. Basin O&M | Flow Rate (mgd) | 1.58 | $178 | 50 | 14.484 | $2,573 |
| | Screening O&M | Flow Rate (mgd) | 1.58 | $7,567 | 20 | 10.910 | $82,554 |
| | Disinfection O&M | Flow Rate (mgd) | 1.58 | $21,239 | 20 | 10.910 | $231,717 |
| | Odor Control O&M | Capacity (cfm) | 300.00 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,085 |
| | | | **Total Annual O&M** | **$56,000** | | **Total PW O&M** | **$616,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 1.74 | $27,182 | 20 | 10.910 | $296,551 |
| | HREP O&M | Flow Rate (mgd) | 1.58 | $30,470 | 20 | 10.910 | $332,425 |
| | Screening O&M | Flow Rate (mgd) | 1.58 | $7,567 | 20 | 10.910 | $82,554 |
| | Disinfection O&M | Flow Rate (mgd) | 1.74 | $22,509 | 20 | 10.910 | $245,570 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,076 |
| | | | **Total Annual O&M** | **$88,000** | | **Total PW O&M** | **$972,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 1.74 | $27,182 | 20 | 10.910 | $296,551 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 1.58 | $178 | 20 | 10.910 | $1,938 |
| | Screening O&M | Flow Rate (mgd) | 1.58 | $7,567 | 20 | 10.910 | $82,554 |
| | Disinfection O&M | Flow Rate (mgd) | 1.74 | $22,509 | 20 | 10.910 | $245,570 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,113 |
| | | | **Total Annual O&M** | **$58,000** | | **Total PW O&M** | **$636,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 1.58 | $25,505 | 20 | 10.910 | $278,256 |
| | Screening O&M | Flow Rate (mgd) | 1.58 | $7,567 | 20 | 10.910 | $82,554 |
| | Disinfection O&M | Flow Rate (mgd) | 1.58 | $21,239 | 20 | 10.910 | $231,717 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,003 |
| | | | **Total Annual O&M** | **$55,000** | | **Total PW O&M** | **$603,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.19 | $21,058 | 20 | 10.910 | $229,738 |
| | Tank O&M | No. Events / Yr | 5 | $3,090 | 50 | 14.484 | $44,747 |
| | | Const Cost ($) | $7,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,534 | 20 | 10.910 | $82,196 |
| | Odor Control O&M | Capacity (cfm) | 10 | $35 | 20 | 10.910 | $382 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,547 |
| | | | **Total Annual O&M** | **$32,000** | | **Total PW O&M** | **$364,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.01 | $916 | 20 | 10.910 | $9,992 |
| | Tank O&M | No. Events / Yr | 5 | $5,442 | 50 | 14.484 | $78,820 |
| | | Const Cost ($) | $948,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,534 | 20 | 10.910 | $82,196 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,511 |
| | | | **Total Annual O&M** | **$15,000** | | **Total PW O&M** | **$177,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 1.19 | $21,058 | 20 | 10.910 | $229,738 |
| | Sed. Basin O&M | Flow Rate (mgd) | 1.19 | $133 | 50 | 14.484 | $1,931 |
| | Screening O&M | Flow Rate (mgd) | 1.19 | $7,534 | 20 | 10.910 | $82,196 |
| | Disinfection O&M | Flow Rate (mgd) | 1.19 | $17,834 | 20 | 10.910 | $194,572 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,600 |
| | | | **Total Annual O&M** | **$48,000** | | **Total PW O&M** | **$524,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 1.30 | $22,442 | 20 | 10.910 | $244,842 |
| | HREP O&M | Flow Rate (mgd) | 1.19 | $25,741 | 20 | 10.910 | $280,831 |
| | Screening O&M | Flow Rate (mgd) | 1.19 | $7,534 | 20 | 10.910 | $82,196 |
| | Disinfection O&M | Flow Rate (mgd) | 1.30 | $18,901 | 20 | 10.910 | $206,204 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,741 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$828,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 1.30 | $22,442 | 20 | 10.910 | $244,842 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 1.19 | $133 | 20 | 10.910 | $1,455 |
| | Screening O&M | Flow Rate (mgd) | 1.19 | $7,534 | 20 | 10.910 | $82,196 |
| | Disinfection O&M | Flow Rate (mgd) | 1.30 | $18,901 | 20 | 10.910 | $206,204 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,946 |
| | | | **Total Annual O&M** | **$50,000** | | **Total PW O&M** | **$543,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 1.19 | $21,058 | 20 | 10.910 | $229,738 |
| | Screening O&M | Flow Rate (mgd) | 1.19 | $7,534 | 20 | 10.910 | $82,196 |
| | Disinfection O&M | Flow Rate (mgd) | 1.19 | $17,834 | 20 | 10.910 | $194,572 |
| | Odor Control O&M | Capacity (cfm) | 20.00 | $70 | 20 | 10.910 | $764 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,540 |
| | | | **Total Annual O&M** | **$47,000** | | **Total PW O&M** | **$515,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.43 | $10,738 | 20 | 10.910 | $117,147 |
| | Tank O&M | No. Events / Yr | 5 | $3,077 | 50 | 14.484 | $44,566 |
| | | Const Cost ($) | $2,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 0 | $7,471 | 20 | 10.910 | $81,512 |
| | Odor Control O&M | Capacity (cfm) | 0 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,835 |
| | | | **Total Annual O&M** | **$22,000** | | **Total PW O&M** | **$247,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.00 | $382 | 20 | 10.910 | $4,163 |
| | Tank O&M | No. Events / Yr | 5 | $5,380 | 50 | 14.484 | $77,914 |
| | | Const Cost ($) | $923,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 0 | $7,471 | 20 | 10.910 | $81,512 |
| | Odor Control O&M | Capacity (cfm) | 0 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,346 |
| | | | **Total Annual O&M** | **$14,000** | | **Total PW O&M** | **$166,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 0.43 | $10,738 | 20 | 10.910 | $117,147 |
| | Sed. Basin O&M | Flow Rate (mgd) | 0.43 | $49 | 50 | 14.484 | $705 |
| | Screening O&M | Flow Rate (mgd) | 0.43 | $7,471 | 20 | 10.910 | $81,512 |
| | Disinfection O&M | Flow Rate (mgd) | 0.43 | $9,650 | 20 | 10.910 | $105,285 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,820 |
| | | | **Total Annual O&M** | **$29,000** | | **Total PW O&M** | **$313,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 0.48 | $11,444 | 20 | 10.910 | $124,849 |
| | HREP O&M | Flow Rate (mgd) | 0.43 | $14,228 | 20 | 10.910 | $155,227 |
| | Screening O&M | Flow Rate (mgd) | 0.43 | $7,471 | 20 | 10.910 | $81,512 |
| | Disinfection O&M | Flow Rate (mgd) | 0.48 | $10,227 | 20 | 10.910 | $111,579 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,382 |
| | | | **Total Annual O&M** | **$44,000** | | **Total PW O&M** | **$482,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 0.48 | $11,444 | 20 | 10.910 | $124,849 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 0.43 | $49 | 20 | 10.910 | $531 |
| | Screening O&M | Flow Rate (mgd) | 0.43 | $7,471 | 20 | 10.910 | $81,512 |
| | Disinfection O&M | Flow Rate (mgd) | 0.48 | $10,227 | 20 | 10.910 | $111,579 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,930 |
| | | | **Total Annual O&M** | **$30,000** | | **Total PW O&M** | **$323,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 0.43 | $10,738 | 20 | 10.910 | $117,147 |
| | Screening O&M | Flow Rate (mgd) | 0.43 | $7,471 | 20 | 10.910 | $81,512 |
| | Disinfection O&M | Flow Rate (mgd) | 0.43 | $9,650 | 20 | 10.910 | $105,285 |
| | Odor Control O&M | Capacity (cfm) | 10.00 | $35 | 20 | 10.910 | $382 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,784 |
| | | | **Total Annual O&M** | **$28,000** | | **Total PW O&M** | **$309,000** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Tank O&M | No. Events / Yr | 5 | #N/A | 50 | 14.484 | #N/A |
| | | Const Cost ($) | #N/A | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Tank O&M | No. Events / Yr | 5 | #N/A | 50 | 14.484 | #N/A |
| | | Const Cost ($) | #N/A | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Sed. Basin O&M | Flow Rate (mgd) | #N/A | #N/A | 50 | 14.484 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | HREP O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Swirl / Vortex O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

| ACSO 034LS28 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Screening O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Disinfection O&M | Flow Rate (mgd) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Odor Control O&M | Capacity (cfm) | #N/A | #N/A | 20 | 10.910 | #N/A |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | #N/A |
| | | | **Total Annual O&M** | **#N/A** | | **Total PW O&M** | **#N/A** |

Cost Summayr

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.1 | $6,074,000 | $0 |
| 1 | $6.1 | $6,074,000 | $0 |
| 2 | $6.1 | $6,074,000 | $0 |
| 4 | $6.1 | $6,074,000 | $0 |
| 6 | $6.1 | $6,074,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.2 | $2,029,000 | $200,000 |
| 1 | $2.1 | $1,910,000 | $182,000 |
| 2 | $2.1 | $1,876,000 | $177,000 |
| 4 | $2.0 | $1,793,000 | $166,000 |
| 6 | #N/A | #N/A | #N/A |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.0 | $2,495,000 | $508,000 |
| 1 | $2.7 | $2,289,000 | $414,000 |
| 2 | $2.3 | $1,925,000 | $364,000 |
| 4 | $1.5 | $1,241,000 | $247,000 |
| 6 | #N/A | #N/A | #N/A |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.6 | $3,770,000 | $864,000 |
| 1 | $3.5 | $2,905,000 | $636,000 |
| 2 | $3.2 | $2,607,000 | $543,000 |
| 4 | $2.2 | $1,845,000 | $323,000 |
| 6 | #N/A | #N/A | #N/A |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.0 | $4,725,000 | $1,237,000 |
| 1 | $5.3 | $4,338,000 | $972,000 |
| 2 | $4.8 | $3,963,000 | $828,000 |
| 4 | $3.5 | $3,039,000 | $482,000 |
| 6 | #N/A | #N/A | #N/A |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $20.1 | $19,277,000 | $785,000 |
| 1 | $19.7 | $19,054,000 | $616,000 |
| 2 | $19.2 | $18,675,000 | $524,000 |
| 4 | $18.3 | $17,972,000 | $313,000 |
| 6 | #N/A | #N/A | #N/A |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.9 | $3,089,000 | $764,000 |
| 1 | $3.5 | $2,853,000 | $603,000 |
| 2 | $3.0 | $2,466,000 | $515,000 |
| 4 | $2.0 | $1,731,000 | $309,000 |
| 6 | #N/A | #N/A | #N/A |

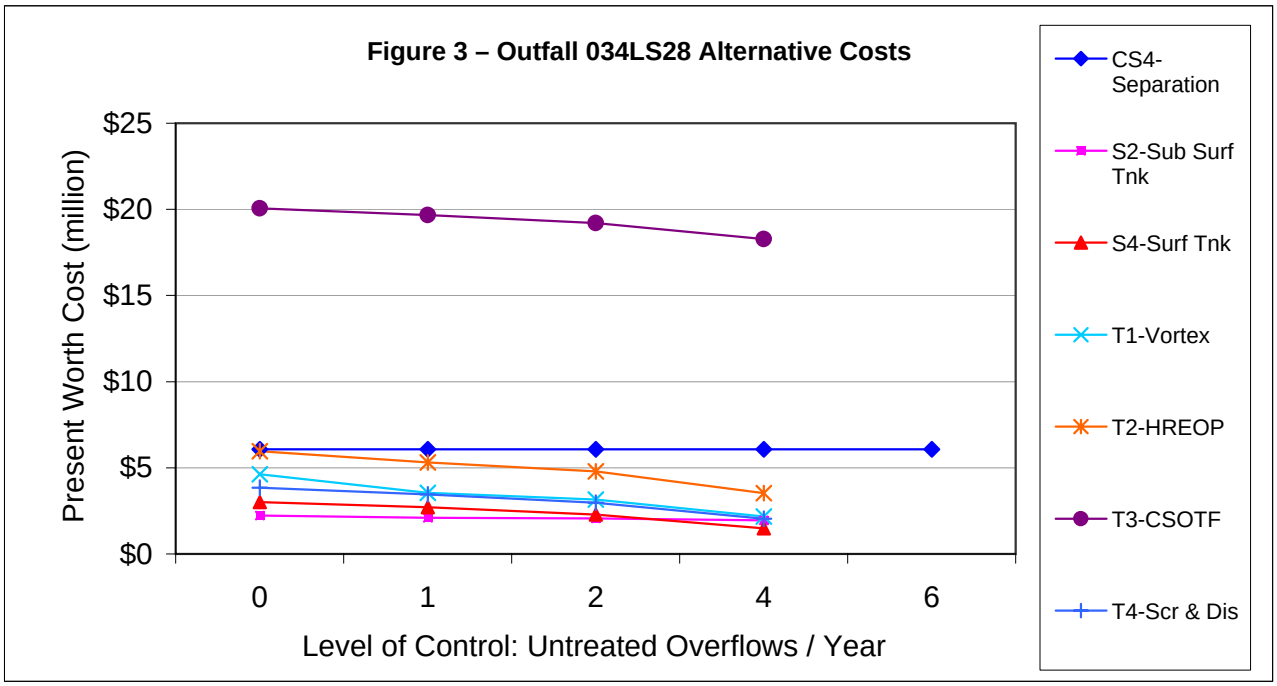


Figure 3 – Outfall 034LS28 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 034LS28 |
| **Location Name** | S-28 |
| **Model ID** | ADC 034LS28-W.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 034LS28 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 5 | |
| Peak Volume: | 3,634 | $ft^3$ |
| | 0.03 | MG |
| Total Volume: | 8,383 | $ft^3$ |
| | 0.06 | MG |
| Peak Rate: | 3.73 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:30 | 35 | 8/20/2005 18:45 | 3634.46 | 27.188 | 0 | 3.73 | 0 |
| 7/5/2005 16:30 | 35 | 7/5/2005 17:00 | 1828.59 | 13.679 | 1 | 1.35 | 3 |
| 5/13/2005 22:35 | 15 | 5/13/2005 22:45 | 1451.97 | 10.861 | 2 | 2.44 | 1 |
| 7/26/2005 19:50 | 15 | 7/26/2005 20:00 | 1076.18 | 8.050 | 3 | 1.83 | 2 |
| 11/9/2005 19:35 | 15 | 11/9/2005 19:45 | 391.56 | 2.929 | 4 | 0.67 | 4 |

# Region 1

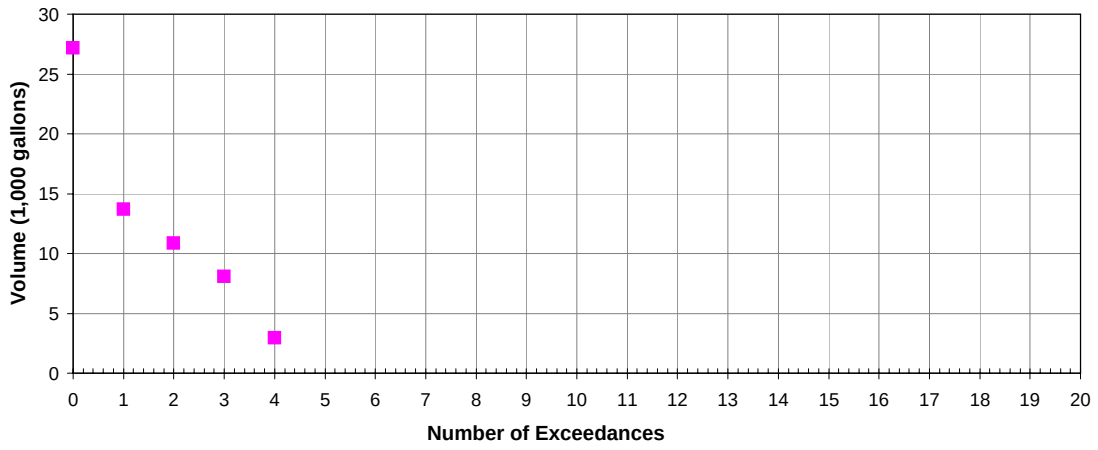
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 034LS28 |
| **Location Name** | S-28 |
| **Model ID** | ADC 034LS28-W.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 034LS28 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

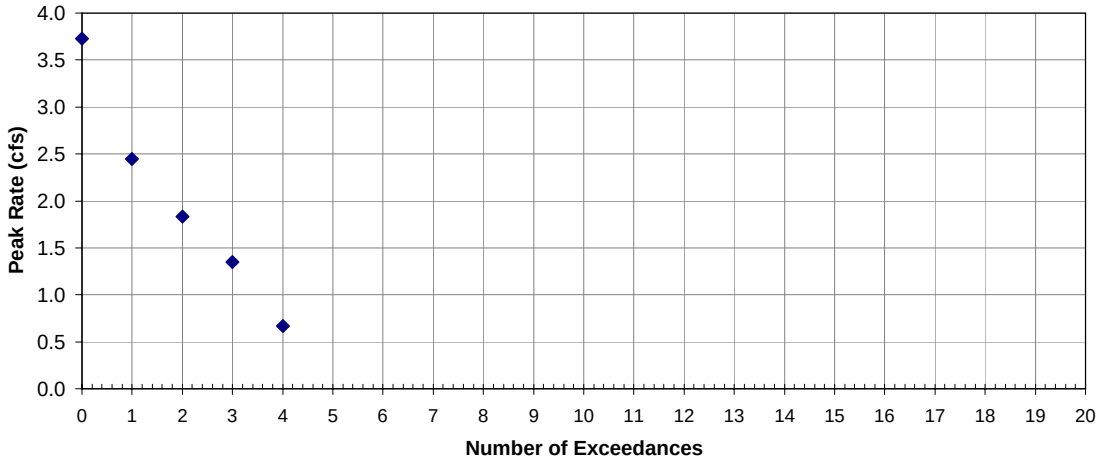
**Results Summary**

| | |
|---|---|
| Number of Events: | 5 |
| Peak Volume: | 3,634 $ft^3$ |
| | 0.03 MG |
| Total Volume: | 8,383 $ft^3$ |
| | 0.06 MG |
| Peak Rate: | 3.73 cfs |

### Figure 1 - Outfall 034LS28 CSO Volume




### Figure 2 - Outfall 034LS28 CSO Peak Flow Rate



## D.26.3 S-28 – SAW MILL RUN INTERCEPTOR SEWERSHED – NPDES# 034LS28

### Description of Outfall

Outfall 034LS28 conveys overflows from the ALCOSAN diversion chamber S-28 to Saw Mill Run. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run adjacent to Saw Mill Run Boulevard near Bausman Street in the City of Pittsburgh. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 034LS28 typically experiences 5 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 034LS28 is approximately 0.03 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 034LS28 is approximately 3.73 CFS. *Figure 1 – Outfall 034LS28 CSO Volume* and *Figure 2 – Outfall 034LS28 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 5 largest CSO events during the typical year baseline conditions simulation.

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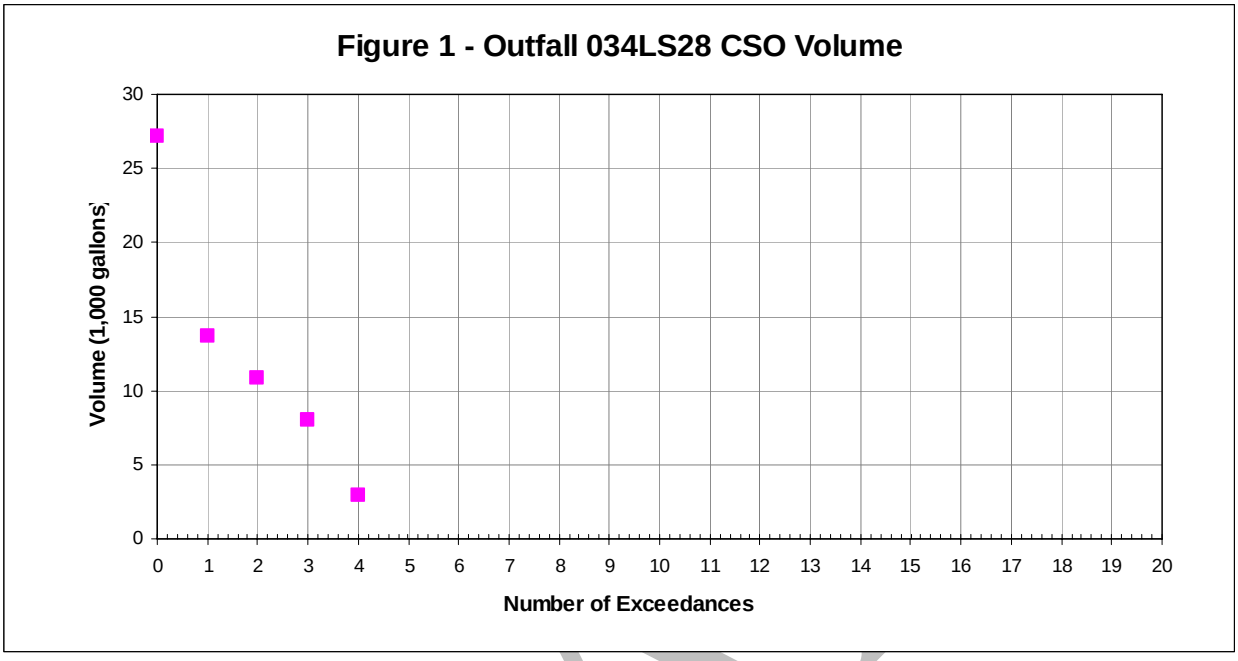


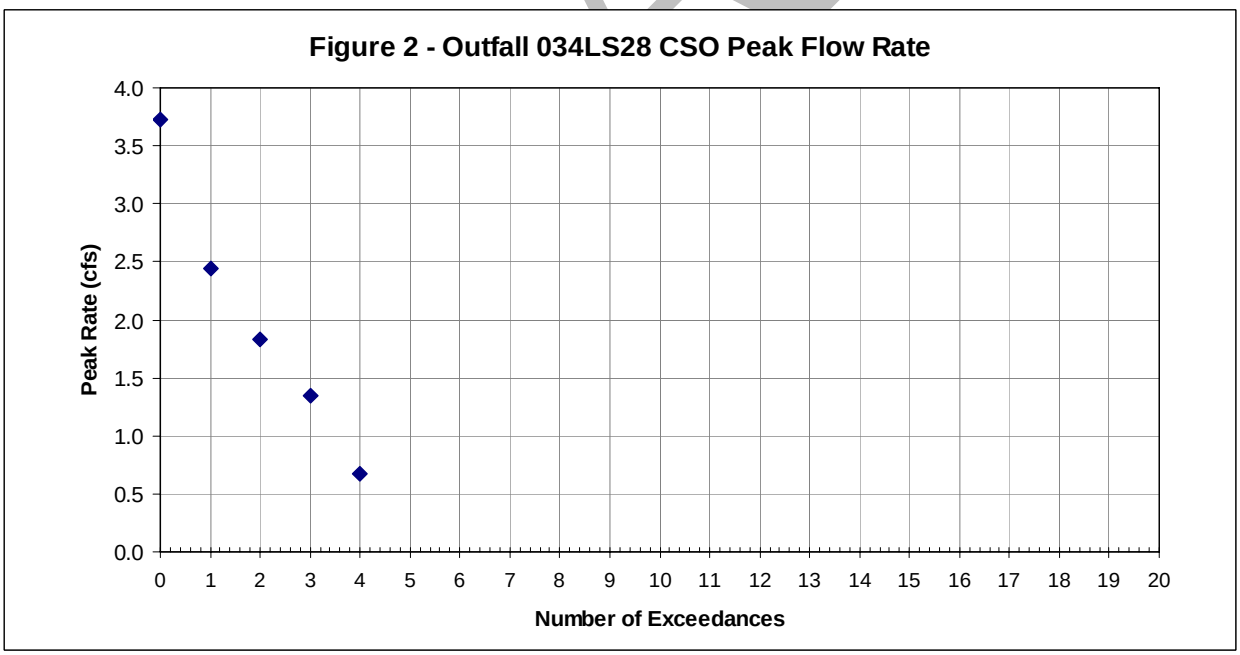


There appears to be limited space available for potential storage or treatment facilities in the vicinity of outfall 034LS28, north of the diversion chamber. Steep slopes may make

construction of a facility difficult. The site is generally bounded by Saw Mill Run and steep slopes.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 034LS28. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-034LS28: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-034LS28: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-034LS28: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes.

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Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-034LS28: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-034LS28: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-034LS28: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-034LS28: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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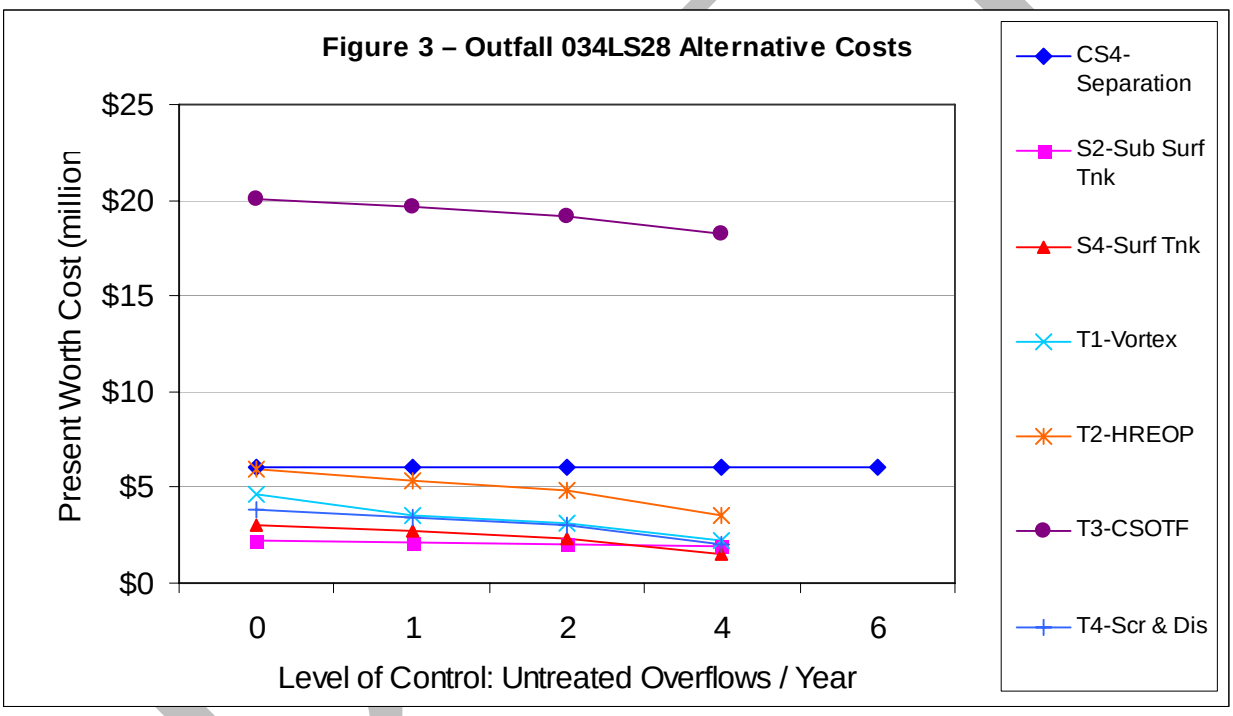
**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 034LS28 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.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**Recommendations**

Based upon the above, for control levels 0 through 2, it is recommended that Alternative S2-034LS28: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. For control level 4, it is recommended that Alternative S4-034LS28: Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses. There are only 5 overflows for this outfall so no recommendations are made or graph shown for control level 6.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

It appears that space may be limited for the construction of storage or treatment facilities for all control levels due to the steep hillsides and limitations due to existing infrastructure.

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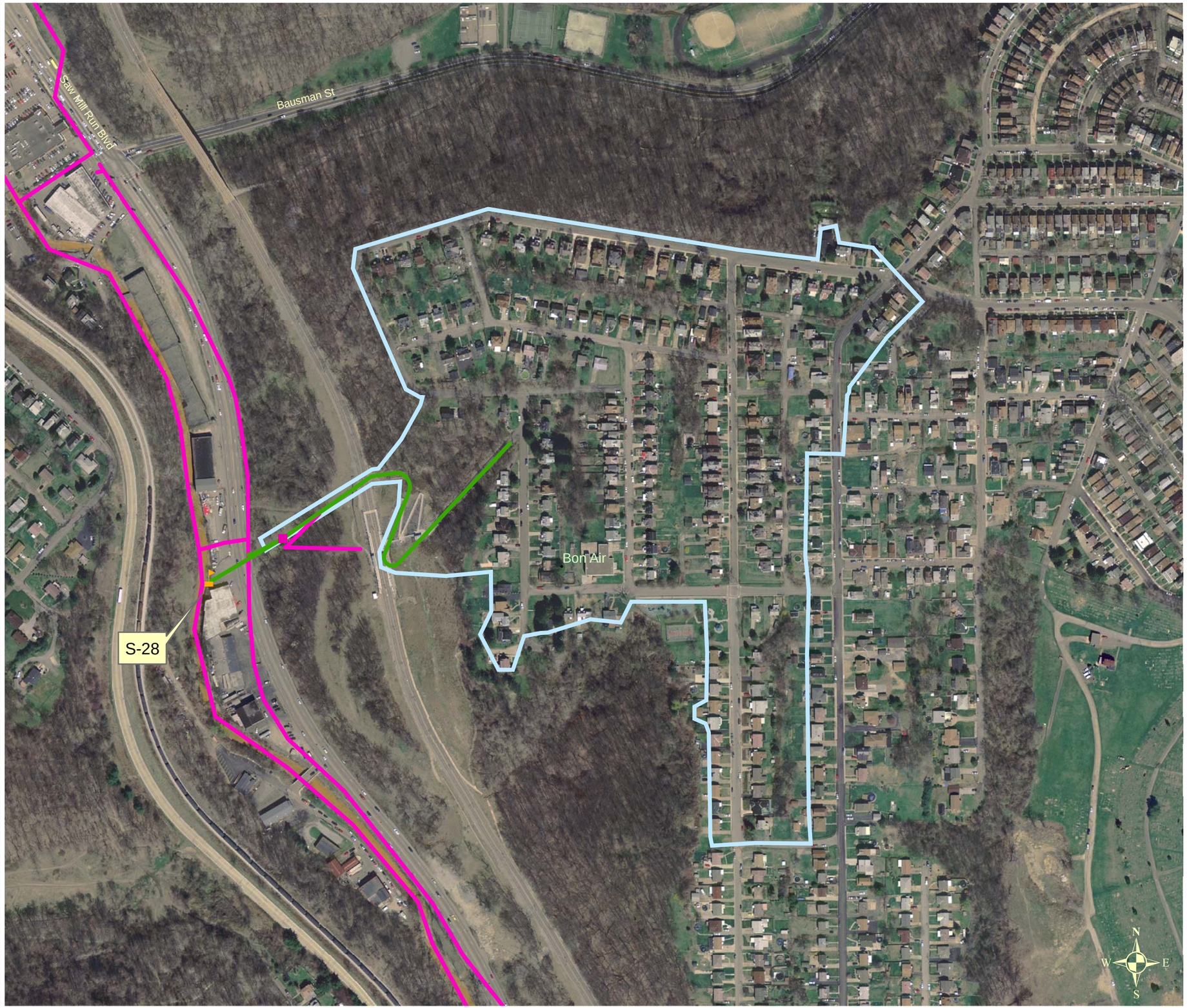


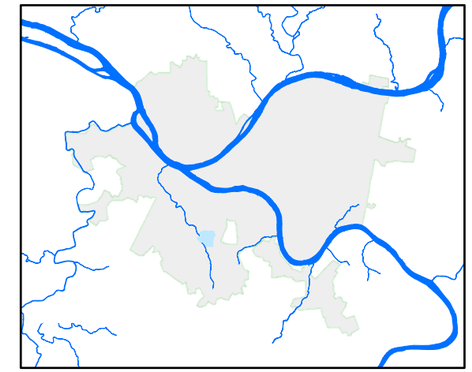

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 290 580 Feet

# Attachment 1
# S-28
# Tributary Area Map
# Saw Mill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA

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# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 235 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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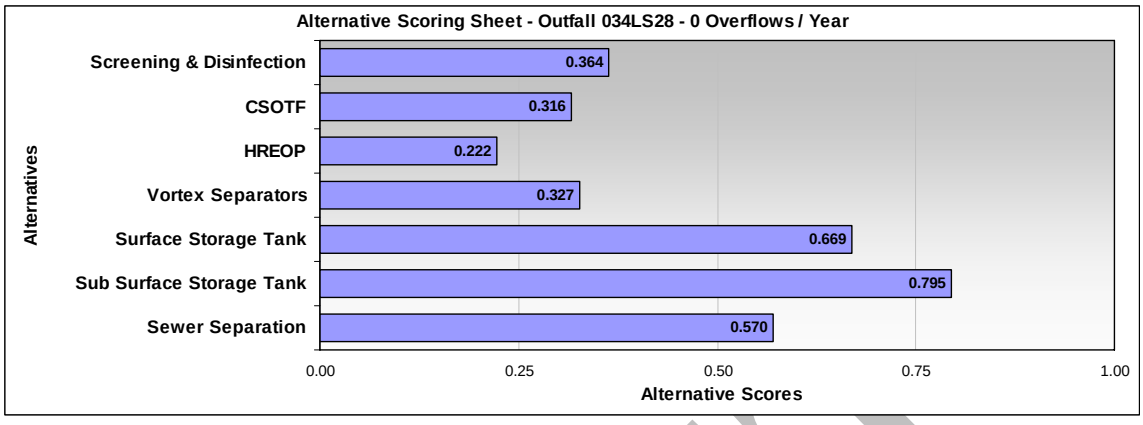
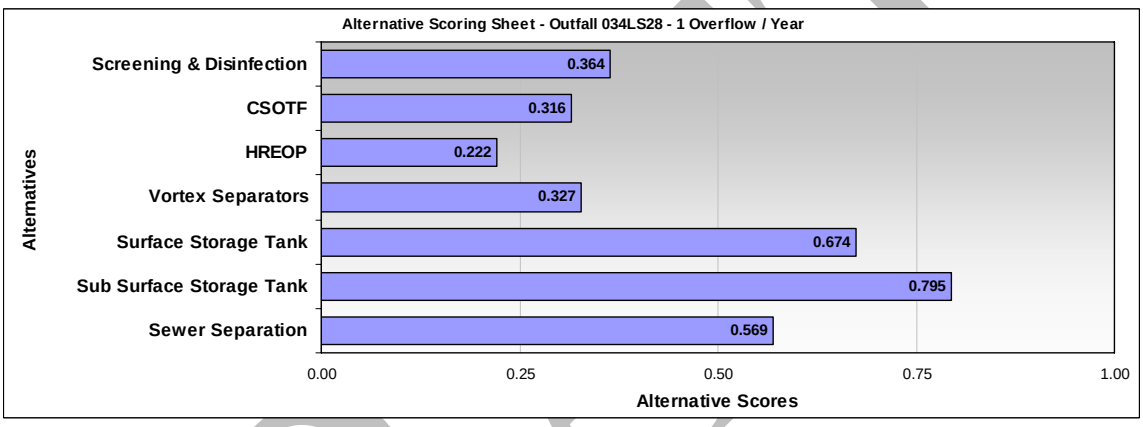
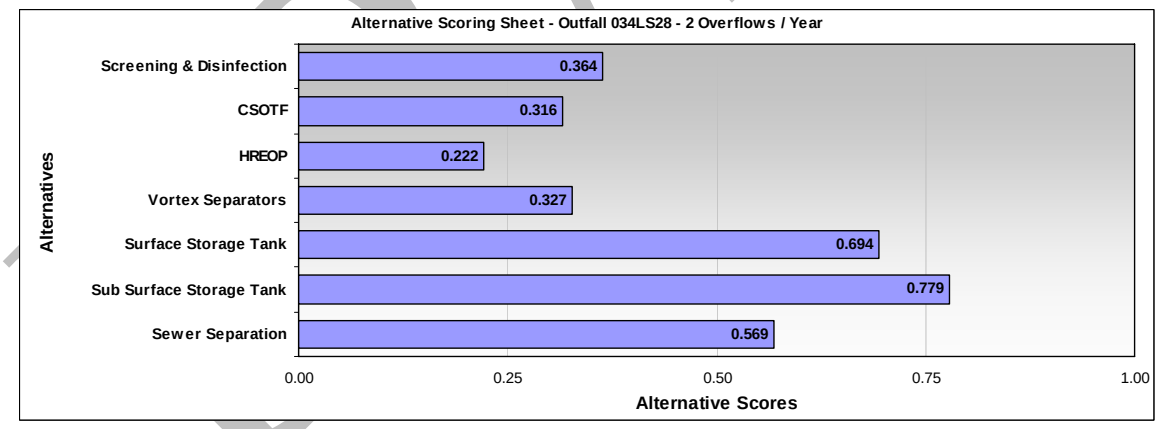
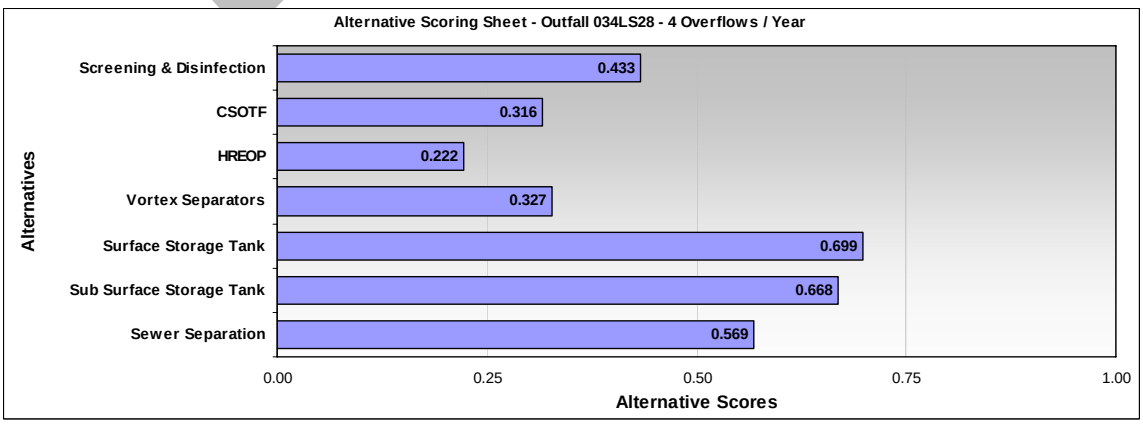
# Attachment 3 – Alternative Scoring Sheet





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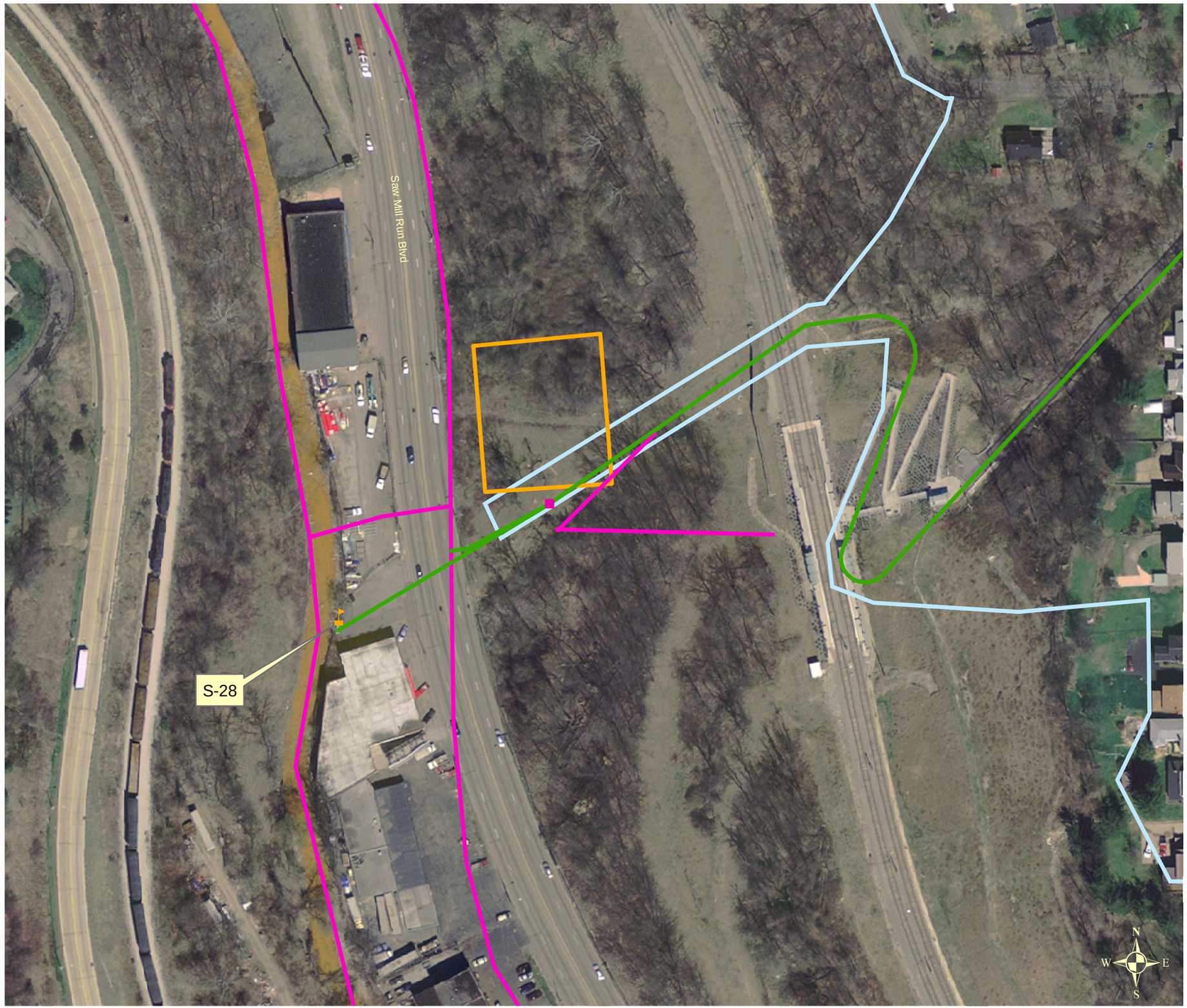
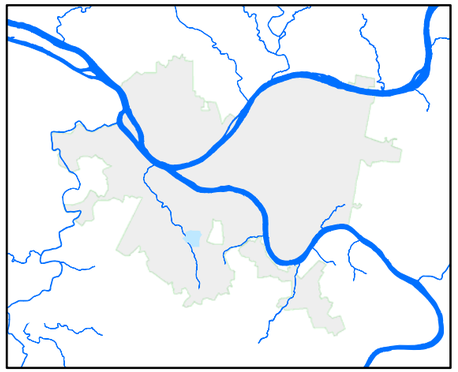


Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# S-28
# Facilities Boundary Map
# Saw Mill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0210.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 3 | 2 | 2 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 4 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 4 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.586** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.550** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.550** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.533** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.533** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.533** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.616** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.616** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.616** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.615** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.652** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.652** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.652** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.588** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.379** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.315** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.283** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.283** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.251** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.473** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.473** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.473** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.441** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.409** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.654** |

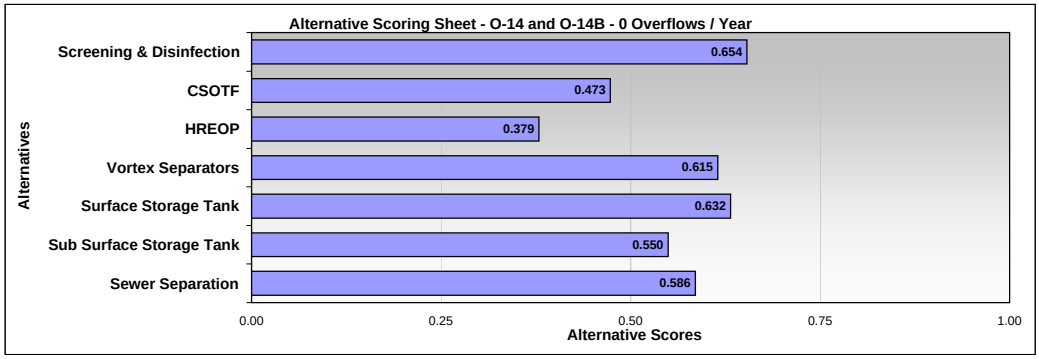
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.654** |

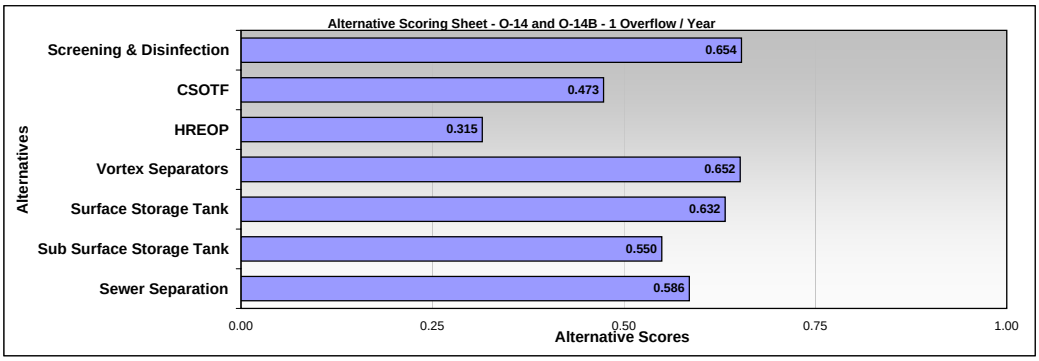
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.654** |

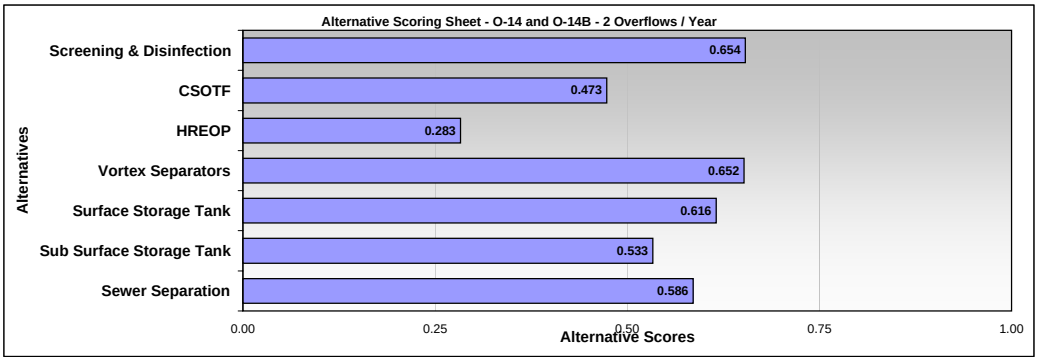
Total Score

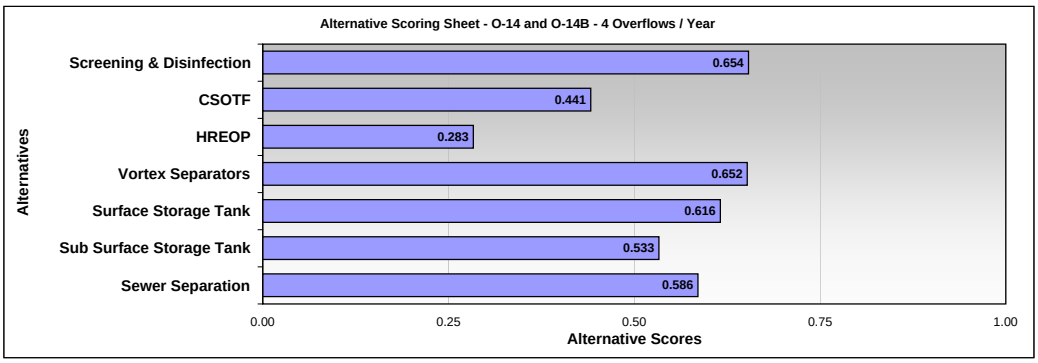
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.654** |

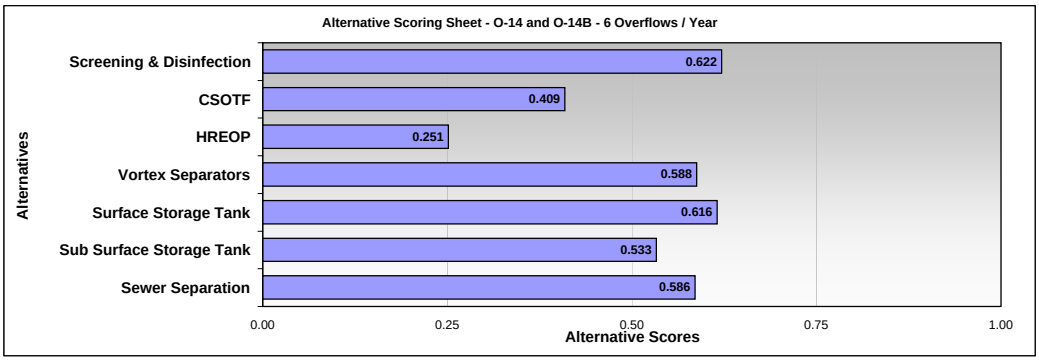
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.622** |


Alternative Scoring Sheet - O-14 and O-14B - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.654
0.473
0.379
0.615
0.632
0.550
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-14 and O-14B - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.654
0.473
0.315
0.652
0.632
0.550
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-14 and O-14B - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.654
0.473
0.283
0.652
0.616
0.533
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-14 and O-14B - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.654
0.441
0.283
0.652
0.616
0.533
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - O-14 and O-14B - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.622
0.409
0.251
0.588
0.616
0.533
0.586
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | |
|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | |
| **0 Overflows / Year** | | | |
| **1. Consolidation Sewer Parameters** | | | |
| Total Consolidation Pipe (Ft) | | 420 | Input by Engineer |
| Peak Flow (CFS) | | 33.05 | 25% of Peak Flow Rate |
| Diameter (In) | | 48 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 88,000 | |
| Peak Flow (CFS) | | 66.10 | 50% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 99.15 | 75% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 132.21 | 100% of Peak Flow Rate |
| Diameter (In) | | 78 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 168,000 | |
| **Construction Cost (Consolidation Sewers)** | **$** | **520,000** | |
| **2. Interceptor Connection Parameters** | | | |
| Diameter (In) | | 24 | |
| Number Connections | | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 48 | |
| Number Connections | | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 72 | |
| Number Connections | | - | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 78 | |
| Number Connections | | 1 | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 142,000 | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **142,000** | |
| **3. Land Acquisition Parameters** | | | |
| Land Acquisition - Consolidation Sewers (SF) | | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | |
| | | **TOTAL CAPITAL COST** | **$ 662,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 4,084 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **816,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 1,778,990 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **3,558,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **820,358,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SURFACE STORAGE TANK** | | | |
| **0 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 73.02 | 9,762,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 85.91 | 11,485,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 1073 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 715 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 86.08 | 11,507,925 | **Sufficient Volume** |
| Tank Area (SF) | 767,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **101,270,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 85.44 | 132.21 | = Peak Rate |
| Force Main Diameter (In) | 64 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 12,075,000** | **$ 77,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 132.21 | | Ref: Technical Parameters |
| Diameter (In) | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | Input by Engineer |
| Depth (Ft) | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 17,228,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 86,140 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$ 3,007,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 85.44 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 4,368,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 73.02 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 36.51 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 25,835,813** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 1,108,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 2,216,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 149,809,813** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 73.02 | 9,762,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 85.91 | 11,485,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 1073 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 715 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 86.08 | 11,507,925 | **Sufficient Volume** |
| Tank Area (SF) | | 767,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **225,799,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 73.02 | 112.99 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 59 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,560,000** | **$ 71,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 132.21 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,228,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 861,400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **18,277,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 85.44 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,368,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 73.02 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 36.51 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **25,835,813** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 1,108,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **2,216,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **288,087,813** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 85.44 | 132.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 9 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **4,572,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 93.98 | 145.43 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 67 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,118,000** | **$ 81,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 132.21 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 260,000 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 13,000 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **683,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 85.44 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,368,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 93.98 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 152 | 73 | |
| Passes / Detention (Min) | | 7 | **15.26** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,907,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 89,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **178,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **25,868,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 85.44 | 132.21 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 14,300 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 170 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 85 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.30 | 173,400 | |
| **Construction Cost (CSOTF)** | **$** | **16,518,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 85.44 | 132.21 | = Peak Rate |
| Force Main Diameter (In) | | 64 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **12,075,000** | **$ 77,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 132.21 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 260,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 13,000 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **683,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 85.44 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,368,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 85.44 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 145 | 69 | |
| Passes / Detention (Min) | | 5 | **15.14** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,801,000** | | |
| **7. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 1.30 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 0.65 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **8,314,818** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **9. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 40,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **80,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **44,877,818** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **0 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 85.44 | | 132.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 1,010 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 46 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 23 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **15,260,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 93.98 | | 145.43 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 67 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **13,118,000** | **$** | **81,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 132.21 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 25,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 1,250 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **109,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 85.44 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **4,368,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 93.98 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 152 | | 73 | |
| Passes / Detention (Min) | 7 | | **15.26** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,907,000 | $ | 2,273,000 | |
| **Construction Cost (Disinfection) $** | **4,180,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 61,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **122,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **38,199,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 9,762,420 | CF |
| | 73.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 132.21 | CFS |
| | 85.44 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 85.44 | | 132.21 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 4,368,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 85.44 | | 132.21 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 64 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 12,075,000** | **$** | **77,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 132.21 | | | Ref: CSO Statistics |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | | | Input by Engineer |
| Depth (Ft) | | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 26,400 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 1,320 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 114,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 85.44 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 145 | | 69 | |
| Passes / Detention (Min) | 5 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ 1,801,000 | $ | 1,924,000 | |
| **Construction Cost (Disinfection)** | **$ 3,725,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 32,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 64,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **21,384,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Consolidation Sewer Parameters** | | | | |
| Total Consolidation Pipe (Ft) | | 420 | | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 33.05 | | 25% of Peak Flow Rate |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 88,000 | | |
| Peak Flow (CFS) | | 66.10 | | 50% of Peak Flow Rate |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 132,000 | | |
| Peak Flow (CFS) | | 99.15 | | 75% of Peak Flow Rate |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 132,000 | | |
| Peak Flow (CFS) | | 132.21 | | 100% of Peak Flow Rate |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | | 25% of Total Length |
| Depth (Ft) | | 20 | | Input by Engineer |
| Subtotal | $ | 168,000 | | |
| **Construction Cost (Consolidation Sewers)** | **$** | **520,000** | | |
| **2. Interceptor Connection Parameters** | | | | |
| Diameter (In) | | 24 | | |
| Number Connections | | - | | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | |
| Number Connections | | - | | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 72 | | |
| Number Connections | | - | | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | |
| Number Connections | | 1 | | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 142,000 | | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **142,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | |
| | | | **TOTAL CAPITAL COST** | **$ 662,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 4,084 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **816,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 1,778,990 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **3,558,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 820,358,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 31.33 | 4,188,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 36.85 | 4,927,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 703 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 469 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 36.99 | 4,945,605 | **Sufficient Volume** |
| Tank Area (SF) | | 330,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **40,262,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 69.50 | 107.55 | = Peak Rate |
| Force Main Diameter (In) | | 57 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,131,000** | **$ 68,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 107.55 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,391,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 36,960 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **1,550,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 69.50 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,630,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 31.33 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 15.66 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **15,623,696** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 486,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **972,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **73,197,696** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | |
| **1 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 31.33 | 4,188,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 36.85 | 4,927,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 703 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 469 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 36.99 | 4,945,605 | **Sufficient Volume** |
| Tank Area (SF) | 330,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **97,389,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 31.33 | 48.47 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 38 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 5,473,000** | **$ 46,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 107.55 | | Ref: Technical Parameters |
| Diameter (In) | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$ -** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 7,391,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 369,550 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 9,416,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 69.50 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 3,630,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 31.33 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 15.66 | | = Peak Vol/DW Time |
| **Construction Cost** | **$ 15,623,696** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$ 299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 486,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 972,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 133,510,696** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 69.50 | 107.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 76.45 | 118.30 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 60 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,979,000** | **$ 72,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 107.55 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 69.50 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,630,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 76.45 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 137 | 66 | |
| Passes | | 5 | **15.29** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,681,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 72,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **144,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **17,467,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 69.50 | 107.55 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 11,600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 153 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 77 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.06 | 141,372 | |
| **Construction Cost (CSOTF)** | **$** | **16,449,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 69.50 | 107.55 | = Peak Rate |
| Force Main Diameter (In) | | 57 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,131,000** | **$ 68,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 107.55 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 212,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 10,600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **582,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 69.50 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,630,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 69.50 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 131 | 63 | |
| Passes | | 5 | **15.35** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,583,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 31.33 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 15.66 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **15,623,696** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 33,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **66,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **49,093,696** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | | |
| **1 Overflows / Year** | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 69.50 | | 107.55 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 820 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 41 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 21 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP)** | **$** | **12,527,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 76.45 | | 118.30 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | | 60 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,979,000** | **$** | **72,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 107.55 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 21,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,050 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **95,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 69.50 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,630,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 76.45 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 137 | | 66 | |
| Passes | | 5 | | **15.29** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,681,000 | $ | 1,784,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,465,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 54,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **108,000** | | | |
| **TOTAL CAPITAL COST** | | | | **$** | **31,837,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 4,188,050 | CF |
| | 31.33 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 107.55 | CFS |
| | 69.50 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **1 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 69.50 | | 107.55 | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,630,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 69.50 | | 107.55 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 57 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **10,131,000** | **$** | **68,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 107.55 | | | Ref: CSO Statistics |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 21,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 1,080 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **97,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 69.50 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 131 | | 63 | |
| Passes | 5 | | **15.35** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,583,000 | $ | 1,671,000 | |
| **Construction Cost (Disinfection) $** | **3,254,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 30,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **60,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **18,201,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | |
|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | |
| **2 Overflows / Year** | | | |
| **1. Consolidation Sewer Parameters** | | | |
| Total Consolidation Pipe (Ft) | | 420 | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 33.05 | 25% of Peak Flow Rate |
| Diameter (In) | | 48 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 88,000 | |
| Peak Flow (CFS) | | 66.10 | 50% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 99.15 | 75% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 132.21 | 100% of Peak Flow Rate |
| Diameter (In) | | 78 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 168,000 | |
| **Construction Cost (Consolidation Sewers)** | **$** | **520,000** | |
| **2. Interceptor Connection Parameters** | | | |
| Diameter (In) | | 24 | |
| Number Connections | | - | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 48 | |
| Number Connections | | - | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 72 | |
| Number Connections | | - | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 78 | |
| Number Connections | | 1 | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 142,000 | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **142,000** | |
| **3. Land Acquisition Parameters** | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | |
| | | **TOTAL CAPITAL COST** | **$ 662,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 4,084 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **816,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 1,778,990 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **3,558,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 820,358,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SURFACE STORAGE TANK** | | | |
| **2 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 25.02 | 3,345,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 29.44 | 3,935,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 628 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 419 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 29.52 | 3,946,980 | **Sufficient Volume** |
| Tank Area (SF) | 263,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **31,515,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 60.36 | 93.39 | = Peak Rate |
| Force Main Diameter (In) | 53 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,015,000** | **$ 63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 93.39 | | Ref: Technical Parameters |
| Diameter (In) | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 5,903,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 29,520 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **1,299,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 60.36 | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,207,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 25.02 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 12.51 | | = Peak Vol/DW Time |
| **Construction Cost $** | **14,085,837** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 392,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **784,000** | | |
| **TOTAL CAPITAL COST $** | | | **60,929,837** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 25.02 | 3,345,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 29.44 | 3,935,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 628 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 419 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 29.52 | 3,946,980 | **Sufficient Volume** |
| Tank Area (SF) | | 263,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **77,971,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.02 | 38.72 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 34 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,704,000** | **$ 42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 93.39 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,903,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 295,150 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,895,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.36 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,207,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 25.02 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 12.51 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **14,085,837** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 392,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **784,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **109,649,837** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **2 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 60.36 | | 93.39 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 66.39 | | 102.73 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 56 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,752,000** | **$** | **67,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 93.39 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.36 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,207,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 66.39 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 128 | | 61 | |
| Passes | | 5 | | **15.20** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,538,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 63,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **126,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **15,651,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 60.36 | 93.39 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 10,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 143 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 72 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.92 | 123,552 | |
| **Construction Cost (CSOTF)** | **$** | **16,420,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 60.36 | 93.39 | = Peak Rate |
| Force Main Diameter (In) | | 53 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,015,000** | **$ 63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 93.39 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 185,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 9,250 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **523,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.36 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,207,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 60.36 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 122 | 58 | |
| Passes | | 5 | **15.15** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,447,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 25.02 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 12.51 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **14,085,837** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 29,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **45,779,837** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **2 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 60.36 | | 93.39 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 720 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 39 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 19 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **10,982,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 66.39 | | 102.73 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 56 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,752,000** | **$** | **67,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 93.39 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **84,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 60.36 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,207,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 66.39 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 128 | | 61 | |
| Passes | 5 | | **15.20** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,538,000 | $ | 1,608,000 | |
| **Construction Cost (Disinfection) $** | **3,146,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 50,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **100,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **28,299,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 3,345,079 | CF |
| | 25.02 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.39 | CFS |
| | 60.36 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **2 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow, into facility (MGD) | | 60.36 | 93.39 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,207,000** | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 60.36 | 93.39 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 53 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,015,000** | **$ 63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 93.39 | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 18,700 | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 940 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **87,000** | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Default Value |
| Peak Flow (MGD) | | 60.36 | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 122 | 58 | |
| Passes | | 5 | **15.15** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,447,000 | $ 1,500,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,947,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | | 29,000 | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **16,338,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | |
|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | |
| **4 Overflows / Year** | | | |
| **1. Consolidation Sewer Parameters** | | | |
| Total Consolidation Pipe (Ft) | | 420 | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 33.05 | 25% of Peak Flow Rate |
| Diameter (In) | | 48 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 88,000 | |
| Peak Flow (CFS) | | 66.10 | 50% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 99.15 | 75% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 132.21 | 100% of Peak Flow Rate |
| Diameter (In) | | 78 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 168,000 | |
| **Construction Cost (Consolidation Sewers)** | **$** | **520,000** | |
| **2. Interceptor Connection Parameters** | | | |
| Diameter (In) | | 24 | |
| Number Connections | | - | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 48 | |
| Number Connections | | - | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 72 | |
| Number Connections | | - | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 78 | |
| Number Connections | | 1 | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 142,000 | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **142,000** | |
| **3. Land Acquisition Parameters** | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | |
| | | **TOTAL CAPITAL COST** | **$ 662,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 4,084 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **816,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 1,778,990 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **3,558,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 820,358,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 21.55 | | 2,881,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 25.36 | | 3,389,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 583 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 389 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 25.45 | | 3,401,805 | **Sufficient Volume** |
| Tank Area (SF) | 227,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **26,783,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 60.12 | | 93.02 | = Peak Rate |
| Force Main Diameter (In) | 53 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **8,986,000** | **$** | **63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 93.02 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 5,084,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 25,420 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **1,156,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 60.12 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,196,000** | | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | 21.55 | | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 10.78 | | | = Peak Vol/DW Time |
| **Construction Cost $** | **13,240,388** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 341,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **682,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **55,067,388** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 21.55 | 2,881,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 25.36 | 3,389,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | | 583 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 389 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 25.45 | 3,401,805 | **Sufficient Volume** |
| Tank Area (SF) | | 227,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **67,286,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 21.55 | 33.35 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 32 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,281,000** | **$ 40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 93.02 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,084,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 254,200 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,023,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.12 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,196,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 21.55 | | Ref: CSO Statistics |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 10.78 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **13,240,388** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 341,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **682,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 96,709,388** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **4 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 60.12 | | 93.02 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 66.13 | | 102.32 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 56 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,719,000** | **$** | **67,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 93.02 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | | Input by Engineer |
| Depth (Ft) | | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.12 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,196,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 66.13 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 128 | | 61 | |
| Passes | | 5 | | **15.26** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,534,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 62,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **124,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **15,601,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 60.12 | 93.02 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 10,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 143 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 72 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.92 | 123,552 | |
| **Construction Cost (CSOTF)** | **$** | **16,420,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 60.12 | 93.02 | = Peak Rate |
| Force Main Diameter (In) | | 53 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **8,986,000** | **$ 63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 93.02 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 185,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 9,250 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **523,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 60.12 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,196,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 60.12 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 122 | 58 | |
| Passes | | 5 | **15.21** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,443,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 21.55 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 10.78 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **13,240,388** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 29,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **44,890,388** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 60.12 | | 93.02 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 710 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 39 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 19 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **10,941,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 66.13 | | 102.32 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 56 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,719,000** | **$** | **67,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 93.02 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **84,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 60.12 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,196,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 66.13 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 128 | | 61 | |
| Passes | 5 | | **15.26** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,534,000 | $ | 1,608,000 | |
| **Construction Cost (Disinfection) $** | **3,142,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 50,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **100,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **28,210,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 2,881,253 | CF |
| | 21.55 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 93.02 | CFS |
| | 60.12 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 60.12 | | 93.02 | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,196,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 60.12 | | 93.02 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 53 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **8,986,000** | **$** | **63,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 93.02 | | | Ref: CSO Statistics |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 930 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **86,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 60.12 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 122 | | 58 | |
| Passes | 5 | | **15.21** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,443,000 | $ | 1,500,000 | |
| **Construction Cost (Disinfection) $** | **2,943,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 29,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **58,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **16,293,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | |
|---|---|---|---|
| **CONSOLIDATION SEWERS** | | | |
| **6 Overflows / Year** | | | |
| **1. Consolidation Sewer Parameters** | | | |
| Total Consolidation Pipe (Ft) | | 420 | Width of Sewershed along Riverline |
| Peak Flow (CFS) | | 33.05 | 25% of Peak Flow Rate |
| Diameter (In) | | 48 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 88,000 | |
| Peak Flow (CFS) | | 66.10 | 50% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 99.15 | 75% of Peak Flow Rate |
| Diameter (In) | | 66 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 132,000 | |
| Peak Flow (CFS) | | 132.21 | 100% of Peak Flow Rate |
| Diameter (In) | | 78 | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 105 | 25% of Total Length |
| Depth (Ft) | | 20 | Input by Engineer |
| Subtotal | $ | 168,000 | |
| **Construction Cost (Consolidation Sewers)** | **$** | **520,000** | |
| **2. Interceptor Connection Parameters** | | | |
| Diameter (In) | | 24 | |
| Number Connections | | - | Input by Engineer, Total 8"-24" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 48 | |
| Number Connections | | - | Input by Engineer, Total 25"-48" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 72 | |
| Number Connections | | - | Input by Engineer, Total 49"-72" Connx |
| Subtotal | $ | - | Ref: Technical Parameters |
| Diameter (In) | | 78 | |
| Number Connections | | 1 | Input by Engineer, Total >73" Connx |
| Subtotal | $ | 142,000 | Ref: Technical Parameters |
| **Construction Cost (Interceptor Connx)** | **$** | **142,000** | |
| **3. Land Acquisition Parameters** | | | |
| Land Acquisition - Consolidation Sewers (SF) | | 0 | Input by Engineer |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | |
| | | **TOTAL CAPITAL COST** | **$ 662,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEWER SEPARATION** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 4,084 | | Ref: CSO Statistics |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **816,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | | | Input by Engr-Typ=# Regs in Region |
| **Construction Cost (Regulators)** | **$** | **-** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 1,778,990 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **3,558,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 820,358,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 12.78 | | 1,708,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 15.03 | | 2,009,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 449 | | | = $(Vol / SWD * 1.5)^{1/2}$ |
| Width (Ft) | 300 | | | = $(Vol / SWD / 1.5)^{1/2}$ |
| Total Volume (MG / CF) | 15.11 | | 2,020,500 | **Sufficient Volume** |
| Tank Area (SF) | 135,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **15,148,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 56.41 | | 87.29 | = Peak Rate |
| Force Main Diameter (In) | 52 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **8,534,000** | **$** | **62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 87.29 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,014,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 15,070 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **767,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 56.41 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,024,000** | | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | 12.78 | | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 6.39 | | | = Peak Vol/DW Time |
| **Construction Cost $** | **11,104,076** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 210,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **420,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **40,020,076** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | |
|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | |
| **6 Overflows / Year** | | | |
| **1. Tank Parameters** | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 12.78 | 1,708,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 15.03 | 2,009,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | **Sufficient Depth** | **Ref: Tech Par, Rev as Req'd** |
| Length (Ft) | 449 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 300 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 15.11 | 2,020,500 | **Sufficient Volume** |
| Tank Area (SF) | 135,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | **40,259,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | |
| Volume Requiring Pumping (%) | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 12.78 | 19.77 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 25 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **3,210,000** | **$ 33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | |
| Peak Flow (CFS) | 87.29 | | Ref: Technical Parameters |
| Diameter (In) | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | Input by Engineer |
| Depth (Ft) | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | |
| Air Changes / Hour (ACH) | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,014,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150,700 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **4,662,000** | | |
| **5. Screening Parameters** | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 56.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,024,000** | | |
| **6. Stored Volume Treatment** | | | |
| Volume Requiring Treatment (MG) | 12.78 | | Ref: CSO Statistics |
| Dewatering Time (Days) | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | 6.39 | | = Peak Vol/DW Time |
| **Construction Cost $** | **11,104,076** | | |
| **7. Regulator / Vortex Drop Parameters** | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | |
| Land Required - Tank (SF) | 210,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **420,000** | | |
| | | **TOTAL CAPITAL COST** | **$ 63,673,076** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 56.41 | 87.29 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 62.05 | 96.02 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 54 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,222,000** | **$ 64,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 87.29 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 56.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,024,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 62.05 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 124 | 59 | |
| Passes | | 5 | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,473,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 59,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **118,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **14,862,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 56.41 | 87.29 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 9,500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 139 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 69 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.86 | 115,092 | |
| **Construction Cost (CSOTF)** | **$** | **16,409,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 56.41 | 87.29 | = Peak Rate |
| Force Main Diameter (In) | | 52 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **8,534,000** | **$ 62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 87.29 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | - | | Input by Engineer |
| Depth (Ft) | | - | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe)** | **$** | **-** | **$ 662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 173,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 8,650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **496,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 56.41 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,024,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 56.41 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 118 | 56 | |
| Passes | | 5 | **15.14** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,385,000** | | |
| **6. Stored Volume Treatment** | | | | |
| Volume Requiring Treatment (MG) | | 12.78 | | Sed Basin Volume |
| Dewatering Time (Days) | | 2 | | **Typ 2, Rev as Req'd** |
| Dewatering Pumping Rate (MGD) | | 6.39 | | = Peak Vol/DW Time |
| **Construction Cost** | **$** | **11,104,076** | | |
| **8. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 28,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **56,000** | | |
| **TOTAL CAPITAL COST** | | | **$** | **42,031,076** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **HIGH RATE END OF PIPE TREATMENT (HREOP)** | | | | |
| **6 Overflows / Year** | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 56.41 | | 87.29 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 670 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 38 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 19 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| **Construction Cost (HREOP) $** | **10,320,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 62.05 | | 96.02 | = Peak Flow / DW Time x % Req Pump |
| Force Main Diameter (In) | 54 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **9,222,000** | **$** | **64,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 87.29 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 17,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | 850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **81,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 56.41 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,024,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 62.05 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 124 | | 59 | |
| Passes | 5 | | **15.24** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,473,000 | $ | 1,536,000 | |
| **Construction Cost (Disinfection) $** | **3,009,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - HREOP (SF) | 48,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **96,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **26,777,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 61 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 1,707,986 | CF |
| | 12.78 | MG |
| Total Volume | 45,085,896 | CF |
| | 337.24 | MG |
| Peak Rate | 87.29 | CFS |
| | 56.41 | MGD |

| #N/A | | | | |
|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | 56.41 | | 87.29 | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,024,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | 56.41 | | 87.29 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 52 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **8,534,000** | **$** | **62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 87.29 | | | Ref: CSO Statistics |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | - | | | Input by Engineer |
| Depth (Ft) | - | | | Input by Engineer |
| **Construction Cost (Local / Cnsldn Pipe) $** | **-** | **$** | **662,000** | Ancillary pipe / Pipe to connect outfalls |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 17,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | 880 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **83,000** | | | |
| **5. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | Default Value |
| Peak Flow (MGD) | 56.41 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | 118 | | 56 | |
| Passes | 5 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) $ | 1,385,000 | $ | 1,431,000 | |
| **Construction Cost (Disinfection) $** | **2,816,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex) $** | **299,000** | | | |
| **7. Land Acquisition Parameters** | | | | |
| Land Required - Screening & Disinfection (SF) | 28,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **56,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **15,536,000** |

**Storage Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 85.44 | $366,973 | 20 | 10.910 | $4,003,655 |
| | Tank O&M | No. Events / Yr | 61 | $290,653 | 50 | 14.484 | $4,209,705 |
| | | Const Cost ($) | $101,270,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 85 | $15,850 | 20 | 10.910 | $172,928 |
| | Odor Control O&M | Capacity (cfm) | 86,140 | $301,490 | 20 | 10.910 | $3,289,238 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $69,326 |
| | | | **Total Annual O&M** | **$975,000** | | **Total PW O&M** | **$11,745,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 73.02 | $330,419 | 20 | 10.910 | $3,604,856 |
| | Tank O&M | No. Events / Yr | 61 | $601,976 | 50 | 14.484 | $8,718,773 |
| | | Const Cost ($) | $225,799,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 85 | $15,850 | 20 | 10.910 | $172,928 |
| | Odor Control O&M | Capacity (cfm) | 861,400 | $3,014,900 | 20 | 10.910 | $32,892,376 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $104,679 |
| | | | **Total Annual O&M** | **$3,964,000** | | **Total PW O&M** | **$45,494,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 85.44 | $366,973 | 20 | 10.910 | $4,003,655 |
| | Sed. Basin O&M | Flow Rate (mgd) | 85.44 | $9,612 | 50 | 14.484 | $139,218 |
| | Screening O&M | Flow Rate (mgd) | 85.44 | $15,850 | 20 | 10.910 | $172,928 |
| | Disinfection O&M | Flow Rate (mgd) | 85.44 | $241,578 | 20 | 10.910 | $2,635,597 |
| | Odor Control O&M | Capacity (cfm) | 13,000.00 | $45,500 | 20 | 10.910 | $496,402 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $67,903 |
| | | | **Total Annual O&M** | **$680,000** | | **Total PW O&M** | **$7,516,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 93.98 | $391,101 | 20 | 10.910 | $4,266,886 |
| | HREP O&M | Flow Rate (mgd) | 85.44 | $318,581 | 20 | 10.910 | $3,475,695 |
| | Screening O&M | Flow Rate (mgd) | 85.44 | $15,850 | 20 | 10.910 | $172,928 |
| | Disinfection O&M | Flow Rate (mgd) | 93.98 | $256,020 | 20 | 10.910 | $2,793,158 |
| | Odor Control O&M | Capacity (cfm) | 1,250.00 | $4,375 | 20 | 10.910 | $47,731 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $112,393 |
| | | | **Total Annual O&M** | **$986,000** | | **Total PW O&M** | **$10,869,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 93.98 | $391,101 | 20 | 10.910 | $4,266,886 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 85.44 | $9,612 | 20 | 10.910 | $104,867 |
| | Screening O&M | Flow Rate (mgd) | 85.44 | $15,850 | 20 | 10.910 | $172,928 |
| | Disinfection O&M | Flow Rate (mgd) | 93.98 | $256,020 | 20 | 10.910 | $2,793,158 |
| | Odor Control O&M | Capacity (cfm) | 13,000.00 | $45,500 | 20 | 10.910 | $496,402 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $78,665 |
| | | | **Total Annual O&M** | **$719,000** | | **Total PW O&M** | **$7,913,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 85.44 | $366,973 | 20 | 10.910 | $4,003,655 |
| | Screening O&M | Flow Rate (mgd) | 85.44 | $15,850 | 20 | 10.910 | $172,928 |
| | Disinfection O&M | Flow Rate (mgd) | 85.44 | $241,578 | 20 | 10.910 | $2,635,597 |
| | Odor Control O&M | Capacity (cfm) | 1,320.00 | $4,620 | 20 | 10.910 | $50,404 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $66,356 |
| | | | **Total Annual O&M** | **$630,000** | | **Total PW O&M** | **$6,929,000** |

**Storage Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 69.50 | $319,696 | 20 | 10.910 | $3,487,865 |
| | Tank O&M | No. Events / Yr | 61 | $138,133 | 50 | 14.484 | $2,000,668 |
| | | Const Cost ($) | $40,262,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 70 | $14,079 | 20 | 10.910 | $153,599 |
| | Odor Control O&M | Capacity (cfm) | 36,960 | $129,360 | 20 | 10.910 | $1,411,310 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $55,424 |
| | | | **Total Annual O&M** | **$602,000** | | **Total PW O&M** | **$7,109,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 31.33 | $187,719 | 20 | 10.910 | $2,048,003 |
| | Tank O&M | No. Events / Yr | 61 | $280,951 | 50 | 14.484 | $4,069,178 |
| | | Const Cost ($) | $97,389,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 70 | $14,079 | 20 | 10.910 | $153,599 |
| | Odor Control O&M | Capacity (cfm) | 369,550 | $1,293,425 | 20 | 10.910 | $14,111,188 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $57,815 |
| | | | **Total Annual O&M** | **$1,777,000** | | **Total PW O&M** | **$20,440,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 69.50 | $319,696 | 20 | 10.910 | $3,487,865 |
| | Sed. Basin O&M | Flow Rate (mgd) | 69.50 | $7,819 | 50 | 14.484 | $113,251 |
| | Screening O&M | Flow Rate (mgd) | 69.50 | $14,079 | 20 | 10.910 | $153,599 |
| | Disinfection O&M | Flow Rate (mgd) | 69.50 | $213,030 | 20 | 10.910 | $2,324,142 |
| | Odor Control O&M | Capacity (cfm) | 10,600.00 | $37,100 | 20 | 10.910 | $404,759 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $57,097 |
| | | | **Total Annual O&M** | **$592,000** | | **Total PW O&M** | **$6,541,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 76.45 | $340,715 | 20 | 10.910 | $3,717,185 |
| | HREP O&M | Flow Rate (mgd) | 69.50 | $282,159 | 20 | 10.910 | $3,078,342 |
| | Screening O&M | Flow Rate (mgd) | 69.50 | $14,079 | 20 | 10.910 | $153,599 |
| | Disinfection O&M | Flow Rate (mgd) | 76.45 | $225,765 | 20 | 10.910 | $2,463,083 |
| | Odor Control O&M | Capacity (cfm) | 1,050.00 | $3,675 | 20 | 10.910 | $40,094 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $93,572 |
| | | | **Total Annual O&M** | **$867,000** | | **Total PW O&M** | **$9,546,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 76.45 | $340,715 | 20 | 10.910 | $3,717,185 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 69.50 | $7,819 | 20 | 10.910 | $85,308 |
| | Screening O&M | Flow Rate (mgd) | 69.50 | $14,079 | 20 | 10.910 | $153,599 |
| | Disinfection O&M | Flow Rate (mgd) | 76.45 | $225,765 | 20 | 10.910 | $2,463,083 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $59,240 |
| | | | **Total Annual O&M** | **$589,000** | | **Total PW O&M** | **$6,478,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 69.50 | $319,696 | 20 | 10.910 | $3,487,865 |
| | Screening O&M | Flow Rate (mgd) | 69.50 | $14,079 | 20 | 10.910 | $153,599 |
| | Disinfection O&M | Flow Rate (mgd) | 69.50 | $213,030 | 20 | 10.910 | $2,324,142 |
| | Odor Control O&M | Capacity (cfm) | 1,080.00 | $3,780 | 20 | 10.910 | $41,240 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $55,778 |
| | | | **Total Annual O&M** | **$551,000** | | **Total PW O&M** | **$6,063,000** |

**Storage Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 60.36 | $290,937 | 20 | 10.910 | $3,174,110 |
| | Tank O&M | No. Events / Yr | 61 | $116,266 | 50 | 14.484 | $1,683,948 |
| | | Const Cost ($) | $31,515,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 60 | $13,104 | 20 | 10.910 | $142,962 |
| | Odor Control O&M | Capacity (cfm) | 29,520 | $103,320 | 20 | 10.910 | $1,127,215 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,038 |
| | | | **Total Annual O&M** | **$524,000** | | **Total PW O&M** | **$6,177,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 25.02 | $161,547 | 20 | 10.910 | $1,762,465 |
| | Tank O&M | No. Events / Yr | 61 | $232,406 | 50 | 14.484 | $3,366,072 |
| | | Const Cost ($) | $77,971,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 60 | $13,104 | 20 | 10.910 | $142,962 |
| | Odor Control O&M | Capacity (cfm) | 295,150 | $1,033,025 | 20 | 10.910 | $11,270,240 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,390 |
| | | | **Total Annual O&M** | **$1,441,000** | | **Total PW O&M** | **$16,591,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 60.36 | $290,937 | 20 | 10.910 | $3,174,110 |
| | Sed. Basin O&M | Flow Rate (mgd) | 60.36 | $6,790 | 50 | 14.484 | $98,348 |
| | Screening O&M | Flow Rate (mgd) | 60.36 | $13,104 | 20 | 10.910 | $142,962 |
| | Disinfection O&M | Flow Rate (mgd) | 60.36 | $195,484 | 20 | 10.910 | $2,132,721 |
| | Odor Control O&M | Capacity (cfm) | 9,250.00 | $32,375 | 20 | 10.910 | $353,209 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $50,863 |
| | | | **Total Annual O&M** | **$539,000** | | **Total PW O&M** | **$5,952,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 66.39 | $310,066 | 20 | 10.910 | $3,382,801 |
| | HREP O&M | Flow Rate (mgd) | 60.36 | $259,692 | 20 | 10.910 | $2,833,226 |
| | Screening O&M | Flow Rate (mgd) | 60.36 | $13,104 | 20 | 10.910 | $142,962 |
| | Disinfection O&M | Flow Rate (mgd) | 66.39 | $207,171 | 20 | 10.910 | $2,260,219 |
| | Odor Control O&M | Capacity (cfm) | 900.00 | $3,150 | 20 | 10.910 | $34,366 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $82,794 |
| | | | **Total Annual O&M** | **$794,000** | | **Total PW O&M** | **$8,736,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 66.39 | $310,066 | 20 | 10.910 | $3,382,801 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 60.36 | $6,790 | 20 | 10.910 | $74,082 |
| | Screening O&M | Flow Rate (mgd) | 60.36 | $13,104 | 20 | 10.910 | $142,962 |
| | Disinfection O&M | Flow Rate (mgd) | 66.39 | $207,171 | 20 | 10.910 | $2,260,219 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $52,695 |
| | | | **Total Annual O&M** | **$538,000** | | **Total PW O&M** | **$5,913,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 60.36 | $290,937 | 20 | 10.910 | $3,174,110 |
| | Screening O&M | Flow Rate (mgd) | 60.36 | $13,104 | 20 | 10.910 | $142,962 |
| | Disinfection O&M | Flow Rate (mgd) | 60.36 | $195,484 | 20 | 10.910 | $2,132,721 |
| | Odor Control O&M | Capacity (cfm) | 940.00 | $3,290 | 20 | 10.910 | $35,894 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,677 |
| | | | **Total Annual O&M** | **$503,000** | | **Total PW O&M** | **$5,535,000** |

**Storage Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 60.12 | $290,155 | 20 | 10.910 | $3,165,571 |
| | Tank O&M | No. Events / Yr | 61 | $104,436 | 50 | 14.484 | $1,512,607 |
| | | Const Cost ($) | $26,783,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 60 | $13,078 | 20 | 10.910 | $142,684 |
| | Odor Control O&M | Capacity (cfm) | 25,420 | $88,970 | 20 | 10.910 | $970,657 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $48,500 |
| | | | **Total Annual O&M** | **$497,000** | | **Total PW O&M** | **$5,840,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 21.55 | $146,214 | 20 | 10.910 | $1,595,184 |
| | Tank O&M | No. Events / Yr | 61 | $205,693 | 50 | 14.484 | $2,979,179 |
| | | Const Cost ($) | $67,286,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 60 | $13,078 | 20 | 10.910 | $142,684 |
| | Odor Control O&M | Capacity (cfm) | 254,200 | $889,700 | 20 | 10.910 | $9,706,573 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $45,262 |
| | | | **Total Annual O&M** | **$1,255,000** | | **Total PW O&M** | **$14,469,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 60.12 | $290,155 | 20 | 10.910 | $3,165,571 |
| | Sed. Basin O&M | Flow Rate (mgd) | 60.12 | $6,763 | 50 | 14.484 | $97,953 |
| | Screening O&M | Flow Rate (mgd) | 60.12 | $13,078 | 20 | 10.910 | $142,684 |
| | Disinfection O&M | Flow Rate (mgd) | 60.12 | $195,005 | 20 | 10.910 | $2,127,489 |
| | Odor Control O&M | Capacity (cfm) | 9,250.00 | $32,375 | 20 | 10.910 | $353,209 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $50,704 |
| | | | **Total Annual O&M** | **$538,000** | | **Total PW O&M** | **$5,938,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 66.13 | $309,232 | 20 | 10.910 | $3,373,701 |
| | HREP O&M | Flow Rate (mgd) | 60.12 | $259,077 | 20 | 10.910 | $2,826,515 |
| | Screening O&M | Flow Rate (mgd) | 60.12 | $13,078 | 20 | 10.910 | $142,684 |
| | Disinfection O&M | Flow Rate (mgd) | 66.13 | $206,662 | 20 | 10.910 | $2,254,674 |
| | Odor Control O&M | Capacity (cfm) | 900.00 | $3,150 | 20 | 10.910 | $34,366 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $82,507 |
| | | | **Total Annual O&M** | **$792,000** | | **Total PW O&M** | **$8,714,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 66.13 | $309,232 | 20 | 10.910 | $3,373,701 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 60.12 | $6,763 | 20 | 10.910 | $73,784 |
| | Screening O&M | Flow Rate (mgd) | 60.12 | $13,078 | 20 | 10.910 | $142,684 |
| | Disinfection O&M | Flow Rate (mgd) | 66.13 | $206,662 | 20 | 10.910 | $2,254,674 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $52,519 |
| | | | **Total Annual O&M** | **$536,000** | | **Total PW O&M** | **$5,897,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 60.12 | $290,155 | 20 | 10.910 | $3,165,571 |
| | Screening O&M | Flow Rate (mgd) | 60.12 | $13,078 | 20 | 10.910 | $142,684 |
| | Disinfection O&M | Flow Rate (mgd) | 60.12 | $195,005 | 20 | 10.910 | $2,127,489 |
| | Odor Control O&M | Capacity (cfm) | 930.00 | $3,255 | 20 | 10.910 | $35,512 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,515 |
| | | | **Total Annual O&M** | **$502,000** | | **Total PW O&M** | **$5,521,000** |

**Storage Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 56.41 | $278,088 | 20 | 10.910 | $3,033,927 |
| | Tank O&M | No. Events / Yr | 61 | $75,348 | 50 | 14.484 | $1,091,315 |
| | | Const Cost ($) | $15,148,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 56 | $12,693 | 20 | 10.910 | $138,476 |
| | Odor Control O&M | Capacity (cfm) | 15,070 | $52,745 | 20 | 10.910 | $575,445 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $45,130 |
| | | | **Total Annual O&M** | **$419,000** | | **Total PW O&M** | **$4,884,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 12.78 | $103,101 | 20 | 10.910 | $1,124,831 |
| | Tank O&M | No. Events / Yr | 61 | $138,126 | 50 | 14.484 | $2,000,559 |
| | | Const Cost ($) | $40,259,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 56 | $12,693 | 20 | 10.910 | $138,476 |
| | Odor Control O&M | Capacity (cfm) | 150,700 | $527,450 | 20 | 10.910 | $5,754,447 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $34,003 |
| | | | **Total Annual O&M** | **$782,000** | | **Total PW O&M** | **$9,052,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 56.41 | $278,088 | 20 | 10.910 | $3,033,927 |
| | Sed. Basin O&M | Flow Rate (mgd) | 56.41 | $6,346 | 50 | 14.484 | $91,919 |
| | Screening O&M | Flow Rate (mgd) | 56.41 | $12,693 | 20 | 10.910 | $138,476 |
| | Disinfection O&M | Flow Rate (mgd) | 56.41 | $187,596 | 20 | 10.910 | $2,046,664 |
| | Odor Control O&M | Capacity (cfm) | 8,650.00 | $30,275 | 20 | 10.910 | $330,298 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $48,160 |
| | | | **Total Annual O&M** | **$515,000** | | **Total PW O&M** | **$5,689,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 62.05 | $296,372 | 20 | 10.910 | $3,233,401 |
| | HREP O&M | Flow Rate (mgd) | 56.41 | $249,569 | 20 | 10.910 | $2,722,785 |
| | Screening O&M | Flow Rate (mgd) | 56.41 | $12,693 | 20 | 10.910 | $138,476 |
| | Disinfection O&M | Flow Rate (mgd) | 62.05 | $198,811 | 20 | 10.910 | $2,169,017 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $78,148 |
| | | | **Total Annual O&M** | **$761,000** | | **Total PW O&M** | **$8,374,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 62.05 | $296,372 | 20 | 10.910 | $3,233,401 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 56.41 | $6,346 | 20 | 10.910 | $69,239 |
| | Screening O&M | Flow Rate (mgd) | 56.41 | $12,693 | 20 | 10.910 | $138,476 |
| | Disinfection O&M | Flow Rate (mgd) | 62.05 | $198,811 | 20 | 10.910 | $2,169,017 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,858 |
| | | | **Total Annual O&M** | **$515,000** | | **Total PW O&M** | **$5,660,000** |

| #N/A | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 56.41 | $278,088 | 20 | 10.910 | $3,033,927 |
| | Screening O&M | Flow Rate (mgd) | 56.41 | $12,693 | 20 | 10.910 | $138,476 |
| | Disinfection O&M | Flow Rate (mgd) | 56.41 | $187,596 | 20 | 10.910 | $2,046,664 |
| | Odor Control O&M | Capacity (cfm) | 880.00 | $3,080 | 20 | 10.910 | $33,603 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $47,037 |
| | | | **Total Annual O&M** | **$482,000** | | **Total PW O&M** | **$5,300,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $820.4 | $820,358,000 | $0 |
| 1 | $820.4 | $820,358,000 | $0 |
| 2 | $820.4 | $820,358,000 | $0 |
| 4 | $820.4 | $820,358,000 | $0 |
| 6 | $820.4 | $820,358,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $333.6 | $288,087,813 | $45,494,000 |
| 1 | $154.0 | $133,510,696 | $20,440,000 |
| 2 | $126.2 | $109,649,837 | $16,591,000 |
| 4 | $111.2 | $96,709,388 | $14,469,000 |
| 6 | $72.7 | $63,673,076 | $9,052,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $161.6 | $149,809,813 | $11,745,000 |
| 1 | $80.3 | $73,197,696 | $7,109,000 |
| 2 | $67.1 | $60,929,837 | $6,177,000 |
| 4 | $60.9 | $55,067,388 | $5,840,000 |
| 6 | $44.9 | $40,020,076 | $4,884,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $33.8 | $25,868,000 | $7,913,000 |
| 1 | $23.9 | $17,467,000 | $6,478,000 |
| 2 | $21.6 | $15,651,000 | $5,913,000 |
| 4 | $21.5 | $15,601,000 | $5,897,000 |
| 6 | $20.5 | $14,862,000 | $5,660,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $49.1 | $38,199,000 | $10,869,000 |
| 1 | $41.4 | $31,837,000 | $9,546,000 |
| 2 | $37.0 | $28,299,000 | $8,736,000 |
| 4 | $36.9 | $28,210,000 | $8,714,000 |
| 6 | $35.2 | $26,777,000 | $8,374,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $52.4 | $44,877,818 | $7,516,000 |
| 1 | $55.6 | $49,093,696 | $6,541,000 |
| 2 | $51.7 | $45,779,837 | $5,952,000 |
| 4 | $50.8 | $44,890,388 | $5,938,000 |
| 6 | $47.7 | $42,031,076 | $5,689,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $28.3 | $21,384,000 | $6,929,000 |
| 1 | $24.3 | $18,201,000 | $6,063,000 |
| 2 | $21.9 | $16,338,000 | $5,535,000 |
| 4 | $21.8 | $16,293,000 | $5,521,000 |
| 6 | $20.8 | $15,536,000 | $5,300,000 |

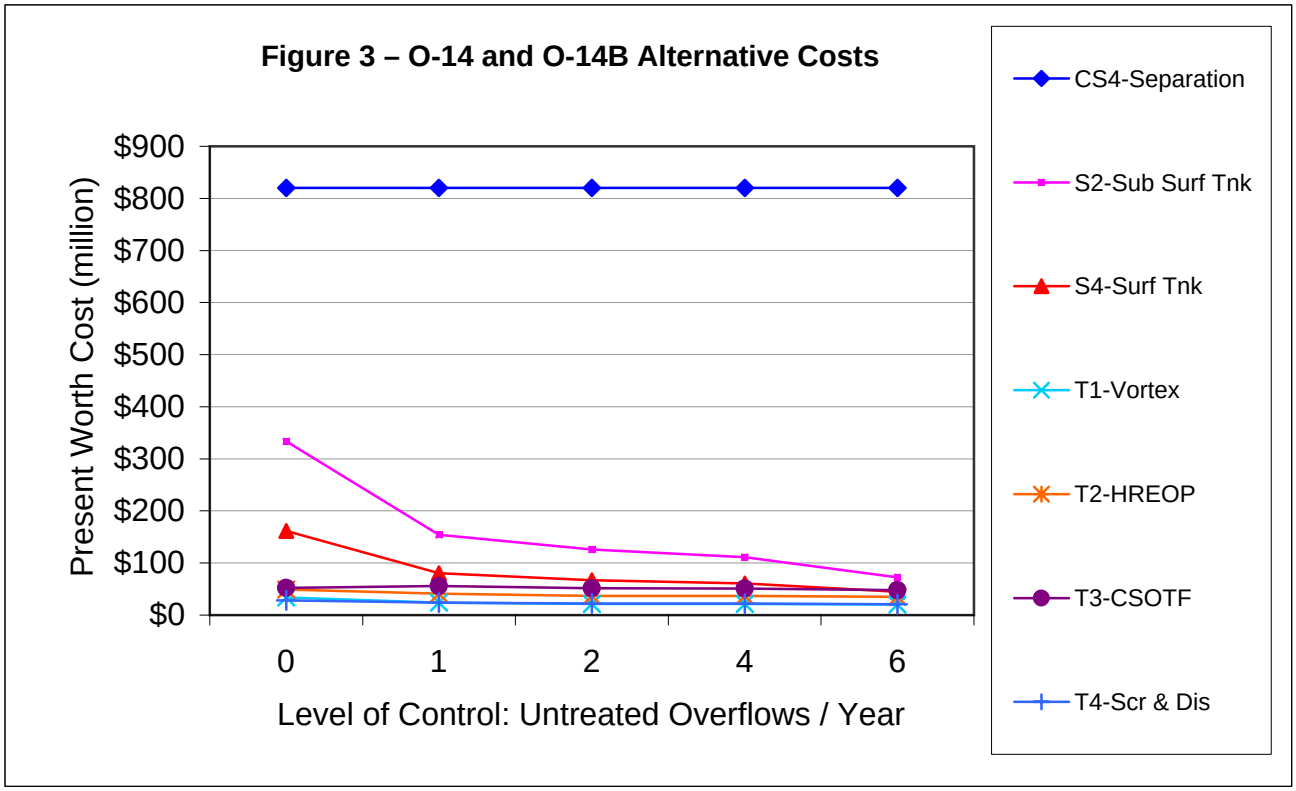
Figure 3 – O-14 and O-14B Alternative Costs
Present Worth Cost (million)
$900
$800
$700
$600
$500
$400
$300
$200
$100
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Region Name** | O-14 and O-14B |
| **Structures within Region** | O-14 and O-14B |
| **Model ID** | O-14 and O-14B.1 |
| **Structure Type** | Consolidation |
| **PWSA Sewershed** | N/A |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | N/A |
| **Owner** | N/A |

**Results Summary**

| | |
|---|---|
| Number of Events: | 61 |
| Peak Volume: | 9,762,420 $ft^3$ |
| | 73.03 MG |
| Total Volume: | 45,085,896 $ft^3$ |
| | 337.27 MG |
| Peak Rate: | 132.21 cfs |

**Model Network** (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2

**Model Run** 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 1:51 | 3647 | 1/6/2005 11:05 | 9762419.83 | 73027.782 | 0 | 69.27 | 21 |
| 1/11/2005 8:55 | 1696 | 1/11/2005 17:45 | 4188050.28 | 31328.710 | 1 | 84.42 | 8 |
| 2/14/2005 5:35 | 1657 | 2/14/2005 10:05 | 3345078.65 | 25022.861 | 2 | 72.20 | 18 |
| 1/3/2005 9:00 | 1489 | 1/3/2005 14:05 | 3147870.57 | 23547.646 | 3 | 79.90 | 11 |
| 3/28/2005 9:20 | 1511 | 3/28/2005 11:55 | 2881252.95 | 21553.213 | 4 | 87.29 | 6 |
| 11/29/2005 7:05 | 929 | 11/29/2005 11:45 | 2268924.73 | 16972.691 | 5 | 93.02 | 4 |
| 4/1/2005 19:50 | 1364 | 4/2/2005 7:00 | 1707985.63 | 12776.586 | 6 | 80.14 | 10 |
| 5/13/2005 22:50 | 1489 | 5/13/2005 23:45 | 1661475.42 | 12428.667 | 7 | 107.55 | 1 |
| 10/25/2005 1:50 | 1270 | 10/25/2005 3:00 | 1623924.47 | 12147.767 | 8 | 49.29 | 26 |
| 1/8/2005 1:45 | 932 | 1/8/2005 5:40 | 1463203.26 | 10945.492 | 9 | 77.70 | 15 |
| 1/13/2005 23:10 | 804 | 1/14/2005 2:15 | 1443549.89 | 10798.475 | 10 | 76.37 | 17 |
| 11/14/2005 22:10 | 595 | 11/15/2005 4:00 | 1052090.58 | 7870.164 | 11 | 93.39 | 2 |
| 12/15/2005 11:50 | 635 | 12/15/2005 14:10 | 1017127.45 | 7608.622 | 12 | 64.66 | 23 |
| 8/20/2005 18:30 | 210 | 8/20/2005 19:00 | 859382.36 | 6428.610 | 13 | 132.21 | 0 |
| 2/20/2005 19:30 | 505 | 2/20/2005 20:35 | 717877.17 | 5370.080 | 14 | 77.55 | 16 |
| 3/23/2005 3:20 | 740 | 3/23/2005 14:00 | 586850.01 | 4389.932 | 15 | 48.86 | 27 |
| 7/5/2005 16:40 | 160 | 7/5/2005 17:15 | 563852.83 | 4217.901 | 16 | 93.10 | 3 |
| 2/9/2005 15:35 | 239 | 2/9/2005 16:55 | 488099.06 | 3651.225 | 17 | 77.95 | 14 |
| 10/24/2005 13:10 | 384 | 10/24/2005 15:45 | 438549.57 | 3280.570 | 18 | 35.12 | 38 |
| 8/29/2005 11:55 | 190 | 8/29/2005 14:00 | 402117.30 | 3008.038 | 19 | 81.80 | 9 |
| 5/11/2005 23:00 | 130 | 5/12/2005 0:00 | 383871.43 | 2871.550 | 20 | 79.75 | 12 |
| 7/26/2005 20:00 | 110 | 7/26/2005 20:30 | 353603.89 | 2645.134 | 21 | 89.88 | 5 |
| 5/28/2005 8:55 | 150 | 5/28/2005 9:40 | 312685.39 | 2339.043 | 22 | 69.70 | 20 |
| 10/7/2005 10:20 | 205 | 10/7/2005 11:10 | 303959.88 | 2273.772 | 23 | 65.34 | 22 |
| 7/15/2005 17:55 | 93 | 7/15/2005 18:30 | 299171.86 | 2237.955 | 24 | 85.11 | 7 |
| 9/29/2005 5:45 | 135 | 9/29/2005 6:15 | 295690.55 | 2211.913 | 25 | 71.24 | 19 |
| 2/16/2005 7:20 | 284 | 2/16/2005 8:25 | 275535.71 | 2061.145 | 26 | 48.02 | 29 |
| 4/23/2005 4:05 | 105 | 4/23/2005 4:45 | 267116.00 | 1998.161 | 27 | 79.53 | 13 |
| 4/22/2005 16:25 | 210 | 4/22/2005 18:50 | 242919.71 | 1817.161 | 28 | 42.92 | 32 |
| 10/22/2005 16:25 | 135 | 10/22/2005 17:00 | 212353.02 | 1588.507 | 29 | 54.56 | 24 |
| 11/1/2005 16:05 | 150 | 11/1/2005 16:40 | 196099.18 | 1466.920 | 30 | 43.83 | 31 |
| 10/22/2005 6:50 | 100 | 10/22/2005 7:45 | 186518.63 | 1395.253 | 31 | 46.07 | 30 |
| 10/21/2005 19:30 | 200 | 10/21/2005 20:05 | 180789.01 | 1352.392 | 32 | 31.48 | 43 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 3/27/2005 17:10 | 134 | 3/27/2005 18:10 | 177544.75 | 1328.123 | 33 | 41.71 | 34 |
| 7/17/2005 16:50 | 100 | 7/17/2005 17:20 | 163929.09 | 1226.272 | 34 | 50.11 | 25 |
| 11/16/2005 4:45 | 494 | 11/16/2005 8:10 | 157031.82 | 1174.677 | 35 | 17.39 | 47 |
| 4/3/2005 2:00 | 519 | 4/3/2005 6:30 | 141812.85 | 1060.831 | 36 | 20.75 | 46 |
| 5/23/2005 16:40 | 100 | 5/23/2005 16:50 | 133513.18 | 998.745 | 37 | 37.95 | 35 |
| 9/26/2005 6:30 | 270 | 9/26/2005 10:00 | 131504.60 | 983.720 | 38 | 35.80 | 37 |
| 9/16/2005 21:55 | 69 | 9/16/2005 22:30 | 121950.23 | 912.249 | 39 | 42.67 | 33 |
| 12/31/2005 23:00 | 60 | 12/31/2005 23:05 | 116486.95 | 871.381 | 40 | 35.10 | 39 |
| 8/8/2005 9:10 | 80 | 8/8/2005 9:50 | 112736.71 | 843.327 | 41 | 37.87 | 36 |
| 5/20/2005 3:30 | 433 | 5/20/2005 8:40 | 100772.41 | 753.828 | 42 | 16.72 | 48 |
| 6/11/2005 17:45 | 80 | 6/11/2005 18:00 | 100011.19 | 748.134 | 43 | 48.46 | 28 |
| 5/28/2005 18:15 | 90 | 5/28/2005 18:35 | 96929.95 | 725.084 | 44 | 33.64 | 41 |
| 12/25/2005 12:50 | 100 | 12/25/2005 13:20 | 86165.96 | 644.564 | 45 | 25.81 | 44 |
| 7/21/2005 14:40 | 130 | 7/21/2005 15:00 | 78751.10 | 589.098 | 46 | 34.47 | 40 |
| 6/3/2005 9:15 | 70 | 6/3/2005 9:35 | 64085.55 | 479.392 | 47 | 24.12 | 45 |
| 11/9/2005 19:40 | 50 | 11/9/2005 20:00 | 38464.81 | 287.736 | 48 | 31.51 | 42 |
| 4/30/2005 6:20 | 75 | 4/30/2005 6:55 | 36963.21 | 276.503 | 49 | 16.31 | 49 |
| 8/27/2005 15:40 | 55 | 8/27/2005 16:10 | 31810.56 | 237.959 | 50 | 15.46 | 50 |
| 6/14/2005 19:40 | 50 | 6/14/2005 20:00 | 20885.05 | 156.231 | 51 | 11.23 | 51 |
| 10/21/2005 7:45 | 70 | 10/21/2005 8:30 | 14560.47 | 108.920 | 52 | 5.29 | 55 |
| 8/26/2005 21:05 | 40 | 8/26/2005 21:15 | 10612.93 | 79.390 | 53 | 8.71 | 52 |
| 4/20/2005 22:00 | 45 | 4/20/2005 22:15 | 8008.57 | 59.908 | 54 | 6.25 | 54 |
| 7/12/2005 20:45 | 25 | 7/12/2005 20:55 | 5671.40 | 42.425 | 55 | 7.03 | 53 |
| 11/8/2005 15:20 | 24 | 11/8/2005 15:30 | 2812.07 | 21.036 | 56 | 3.66 | 56 |
| 7/25/2005 17:45 | 20 | 7/25/2005 17:55 | 1788.84 | 13.381 | 57 | 2.87 | 57 |
| 1/30/2005 14:50 | 19 | 1/30/2005 14:55 | 613.40 | 4.589 | 58 | 0.91 | 58 |
| 5/7/2005 13:40 | 29 | 5/7/2005 13:45 | 320.61 | 2.398 | 59 | 0.85 | 59 |
| 4/27/2005 1:15 | 19 | 4/27/2005 1:20 | 161.77 | 1.210 | 60 | 0.29 | 60 |


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# Region 1

## PWSA CSO DISCHARGES for "Typical Year - 2005" Base Line Condition

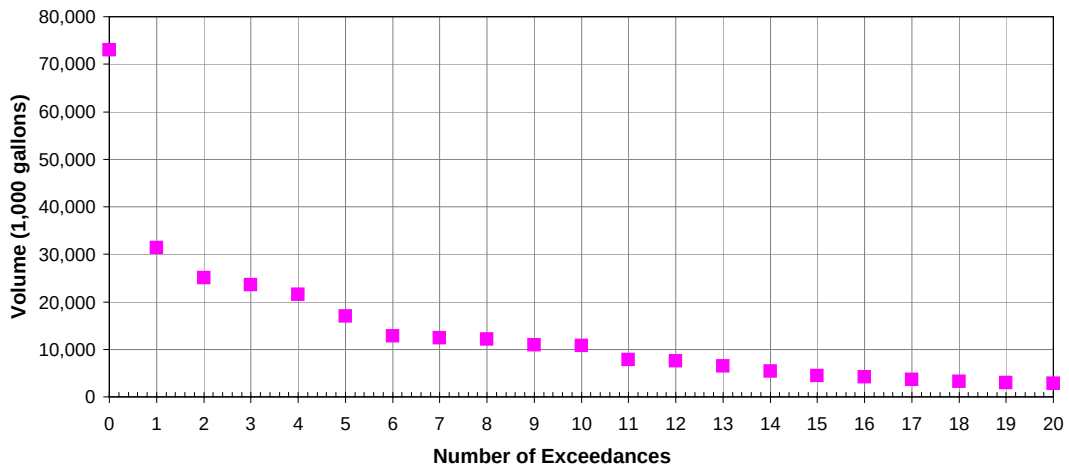
| | |
|---|---|
| **Region Name** | O-14 and O-14B |
| **Structures within Region** | O-14 and O-14B |
| **Model ID** | O-14 and O-14B.1 |
| **Structure Type** | Consolidation |
| **PWSA Sewershed** | N/A |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | N/A |
| **Owner** | N/A |

**Results Summary**

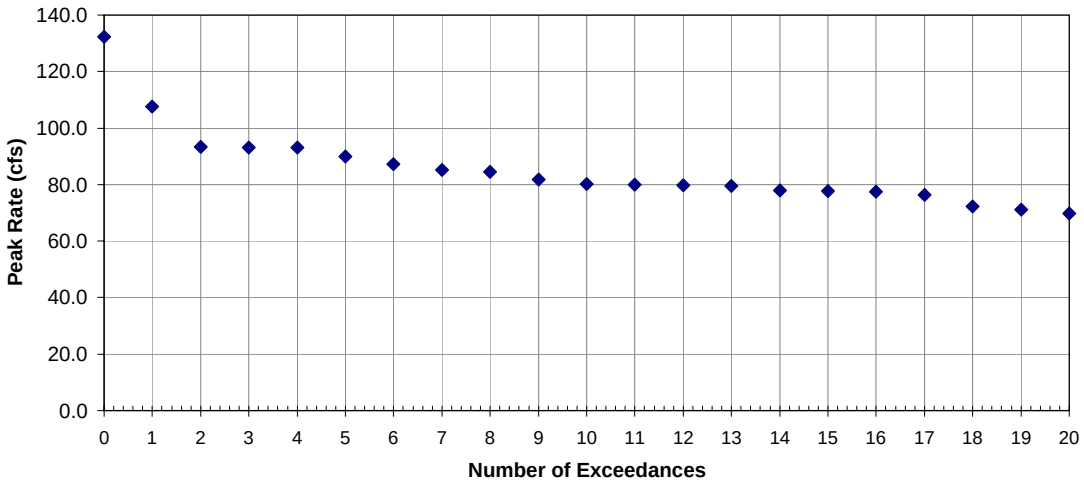
| | |
|---|---|
| Number of Events: | 61 |
| Peak Volume: | 9,762,420 $ft^3$ |
| | 73.03 MG |
| Total Volume: | 45,085,896 $ft^3$ |
| | 337.27 MG |
| Peak Rate: | 132.21 cfs |

| | |
|---|---|
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection |

### Figure 1 - O-14 and O-14B CSO Volume




### Figure 2 - O-14 and O-14B CSO Peak Flow Rate



## D.26.4 O-14 AND O-14B – SAW MILL RUN INTERCEPTOR SEWERSHEDS – NPDES# 007PO14 AND 007NO14B

### Description of Outfalls

The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. These sewersheds include approximately 12,984 acres of residential, business and commercial users.

These outfalls 007PO14 and 007NO14B are in the Saw Mill Run Sewershed. The outfall 007PO14 sewershed consists of 4,070 acres of combined sewers. The outfall 007PO14B sewershed consists of 14 acres of combined sewers. Outfalls 007PO14 and 007NO14B currently convey overflows from each of the respective ALCOSAN diversion chambers to the Ohio River. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO locations and the tributary areas.

Outfalls 007PO14 and 007NO14B typically experience 61 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from all the outfalls is approximately 73.03 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from both outfalls is approximately 132.21 CFS. Figures 1 and 2 illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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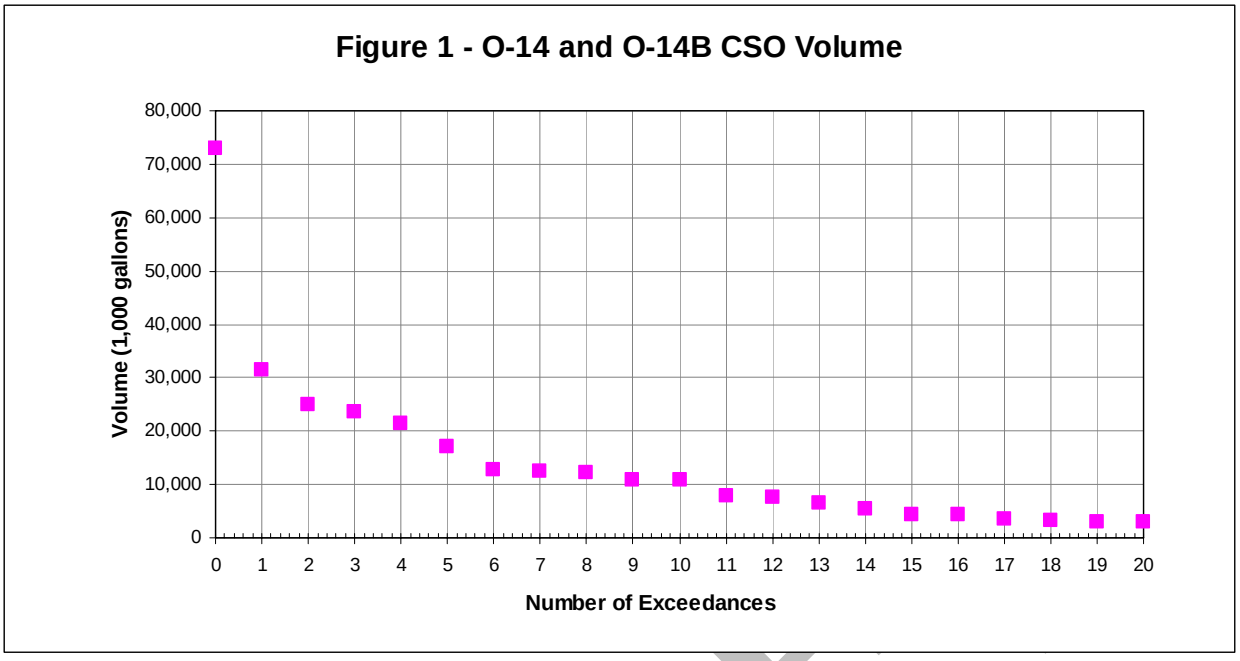


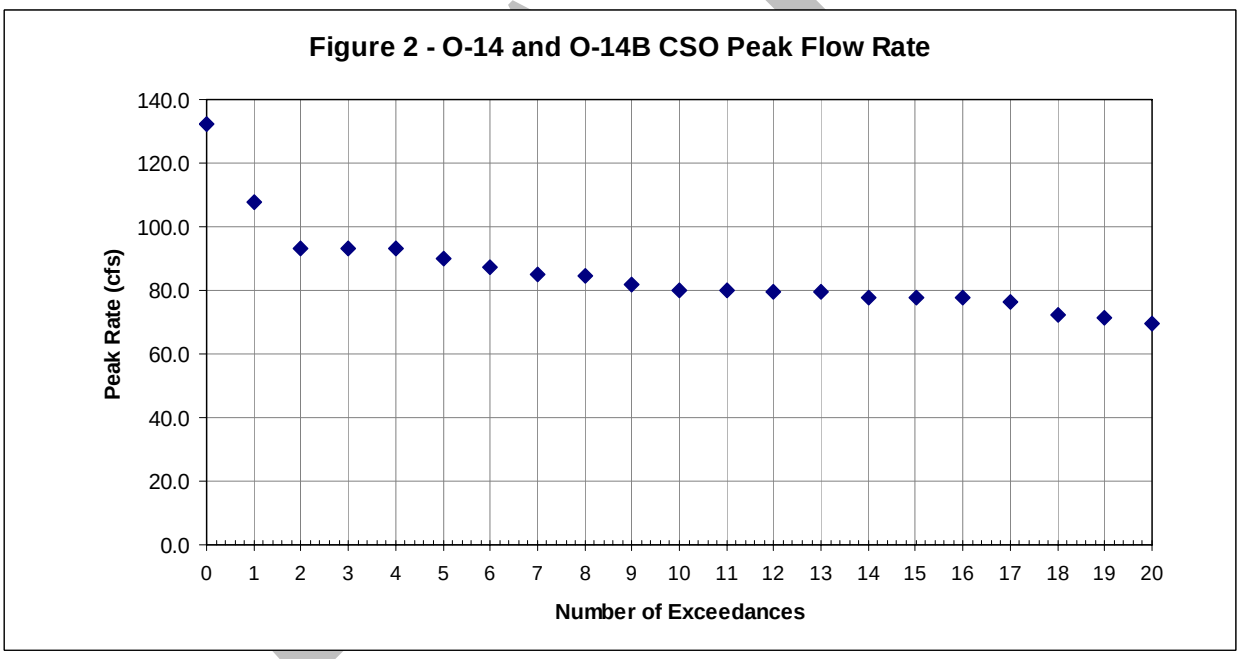


A necessary component of all storage and treatment alternatives would be the construction of a consolidation sewer. The sewer is required to convey CSOs from outfall 007NO14B to the vicinity of outfall 007PO14.

There appears to be a limited amount of available space for potential storage or treatment facilities to both the east and west of the West End Bridge. Control of CSOs will require a

significant storage and treatment area. The site is very congested with underground utilities, existing buildings, bridge piers and related infrastructure. Critical infrastructure in this area includes railroad tracks, the West End Bridge, the West End Circle, Route 51 and multiple ALCOSAN interceptors. The site is generally bounded by the Ohio River to the north, Route 51 to the south and private property to west and east.

**Description of Consolidated Outfall Alternatives**

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from the outfalls. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

***Collection System Alternatives***

CS4-O-14 AND O-14B: Sewer Separation

- Perform complete sewer separation of the tributary areas. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

***Storage Alternatives***

S2-O-14 AND O-14B: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

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S4-O-14 AND O-14B: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-O-14 AND O-14B: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-O-14 AND O-14B: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-O-14 AND O-14B: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

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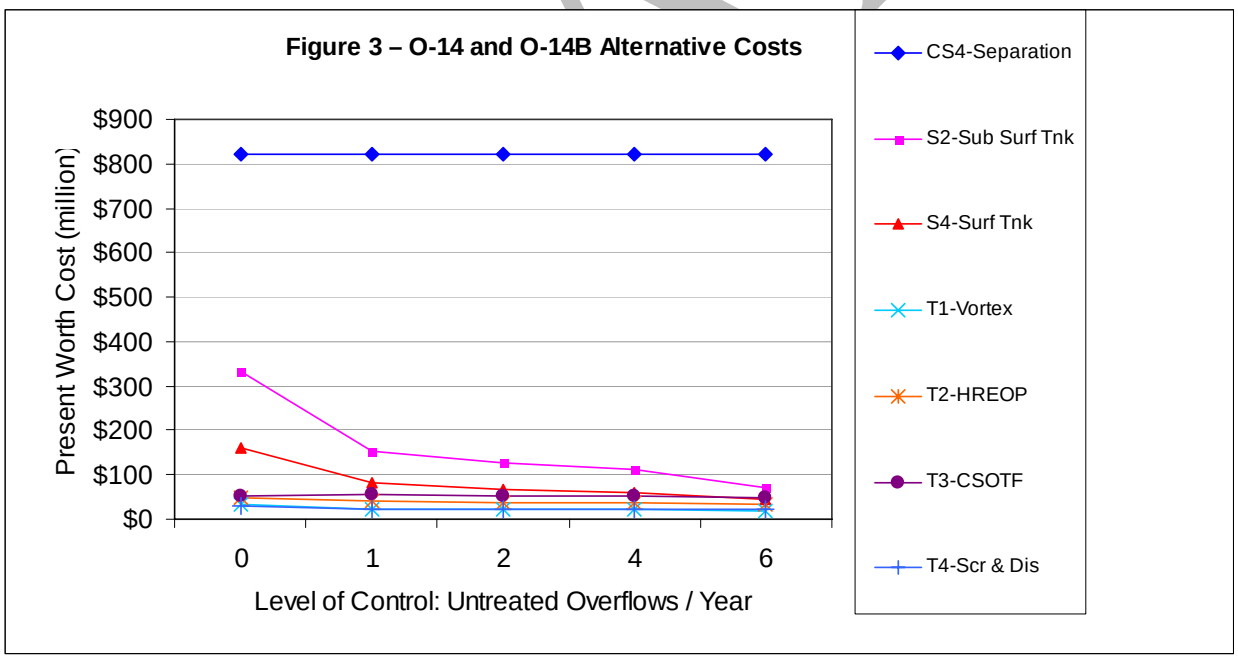
T4-O-14 AND O-14B: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – O-14 and O-14B Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" at each control level.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*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, it is recommended that Alternative T4-O-14 and O-14B: Screening and Disinfection be carried forward and re-evaluated with the results of the system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Several significant issues exist with the siting of a CSO treatment facility. Construction of the consolidation sewer will be a significant endeavor considering the congested infrastructure that exists along the river in this area.

Space is a major issue in this area. Approximately 200 feet of space exists between Route 51 and the Ohio River. This space is congested with critical infrastructure described above. Significant property acquisition and site work will be required to construct a treatment facility adjacent to the outfall. A cursory review of the area upstream of the outfalls showed significant development along Saw Mill Run, which makes construction of a treatment facility further upstream a challenge.

Permitting of the project would involve several agencies including PennDOT and the railroad(s).

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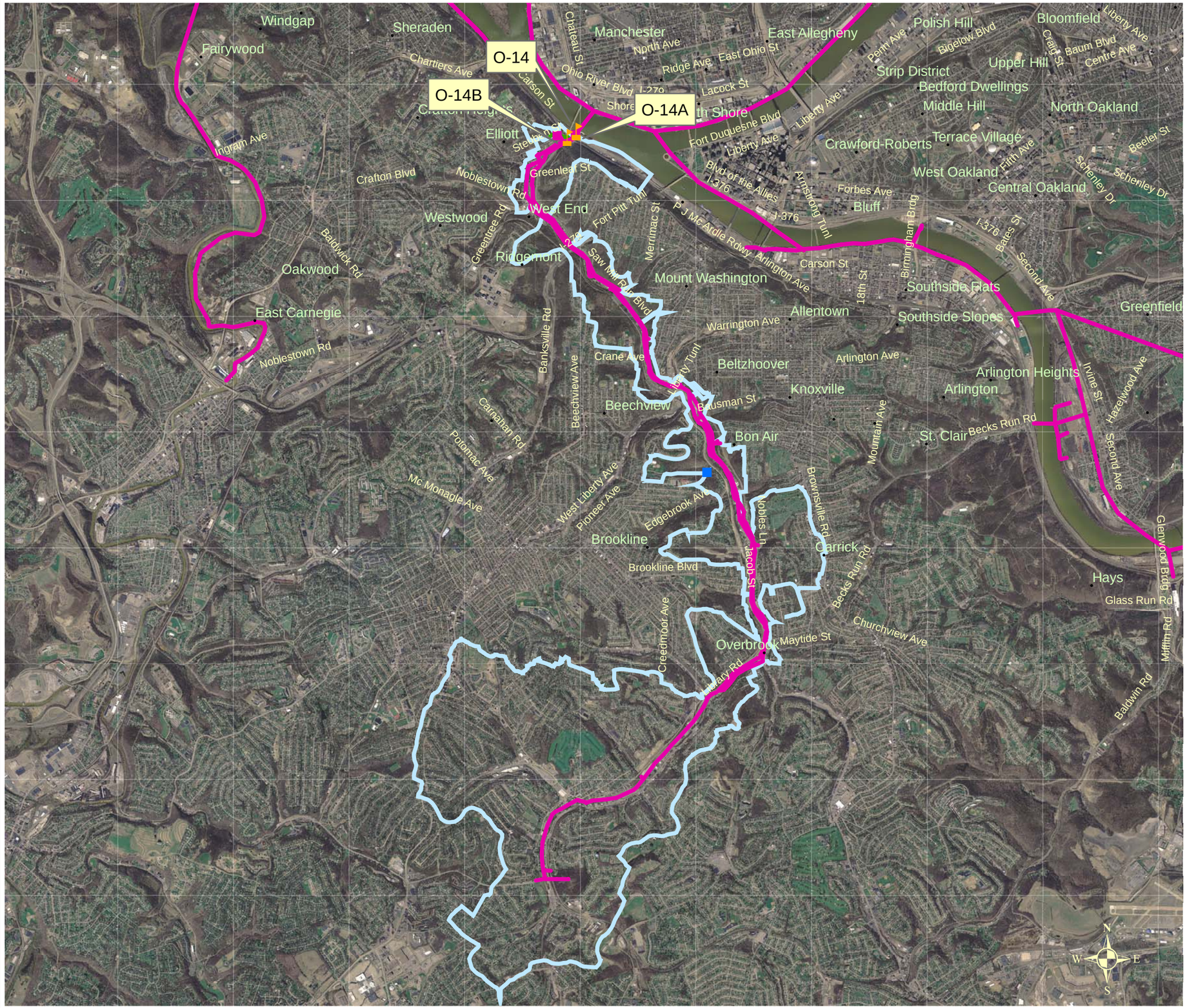


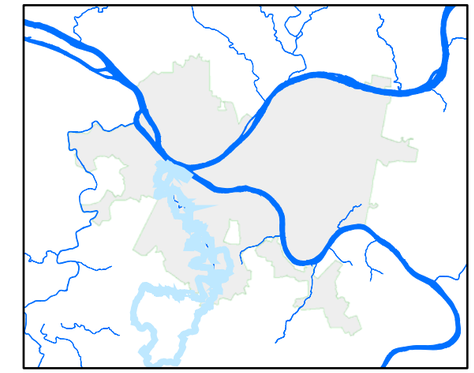

Area Overview

## Legend

- Sewershed Boundary
- Trunk Sewer
- ALCOSAN Interceptor
- ALCOSAN Diversion Structure
- PWSA Diversion Structure
- Combined Sewer Outfall

# Attachment 1
# O-14 to O-14B
# Tributary Area Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0212.pdf

Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will not be evaluated. |
| Sewer separation | Y | Sewer separation will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with all storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with all treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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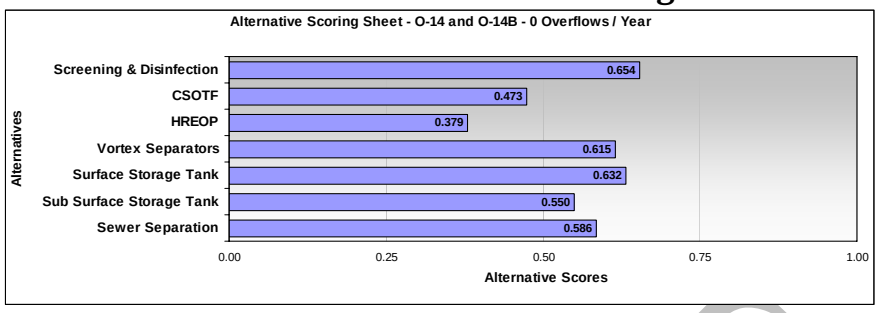
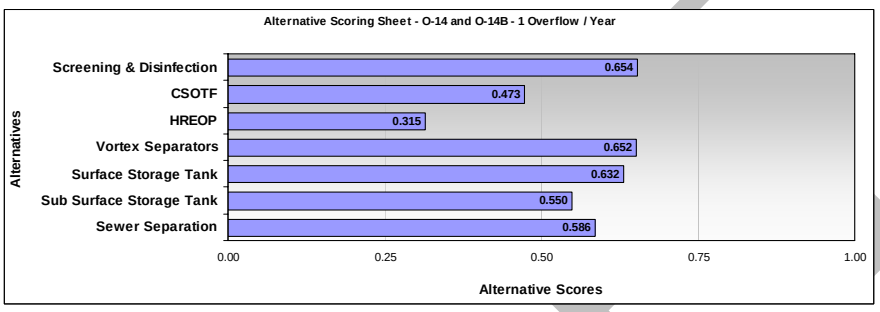
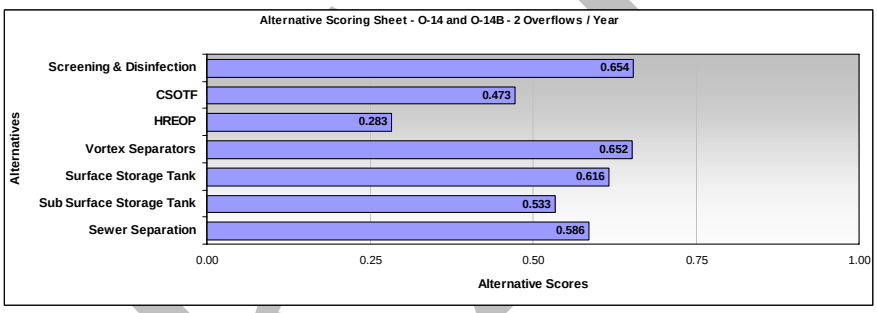
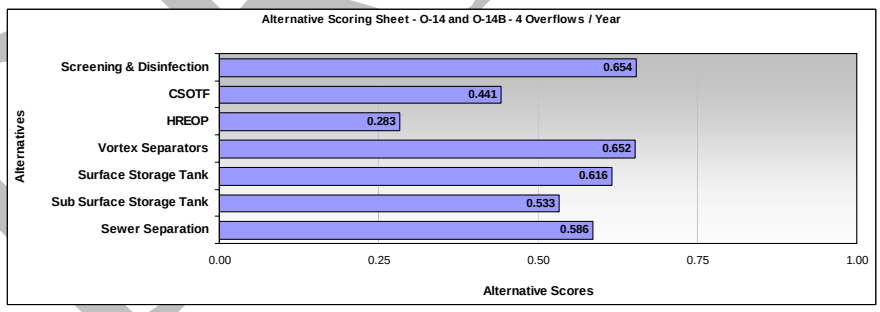
SW-D-0212.pdf

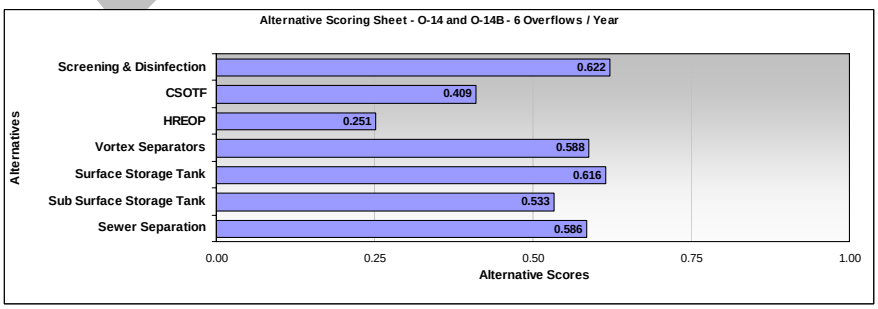
# Attachment 3 – Alternative Scoring Sheet

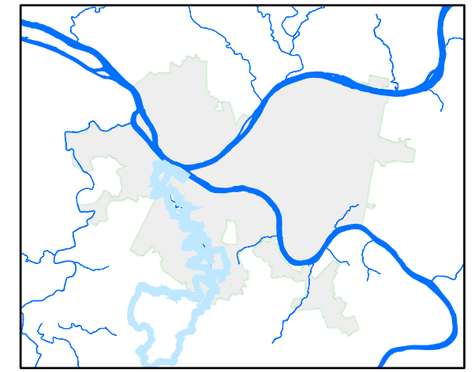




Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 390 780 Feet

# Attachment 4
# O-14 to O-14B
# Facilities Boundary Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER SYSTEM Quality Water Quality Service

SW-D-0212.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 4 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 2 | 2 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 3 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 2 | 2 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.747** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.678** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.605** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.556** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.556** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.561** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.359** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.359** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.359** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.380** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.501** |

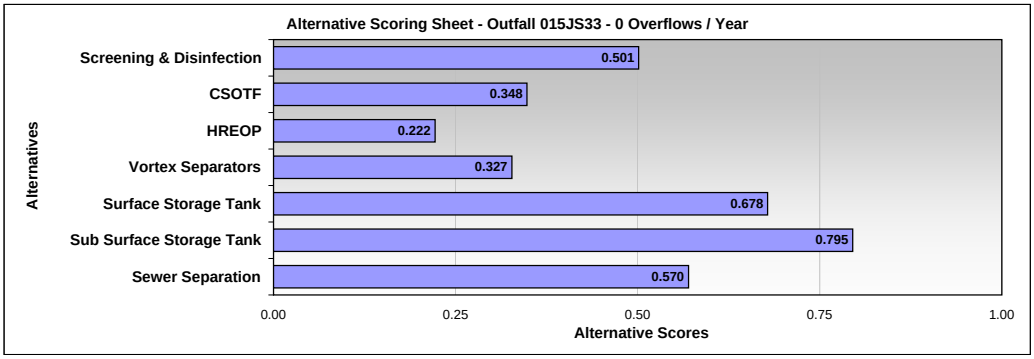
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

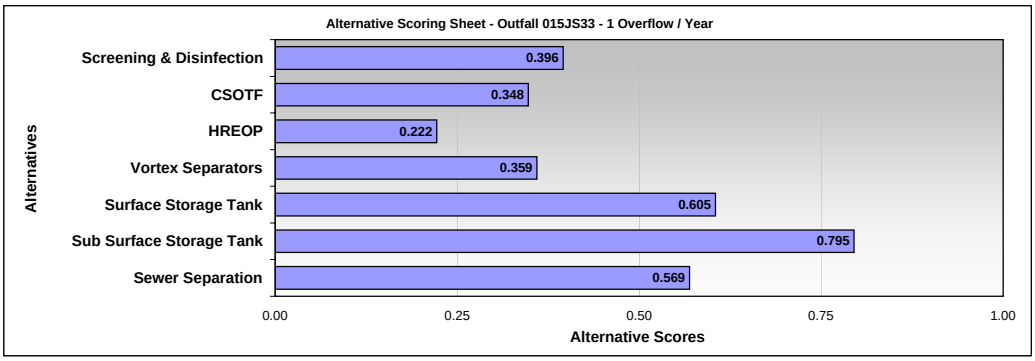
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

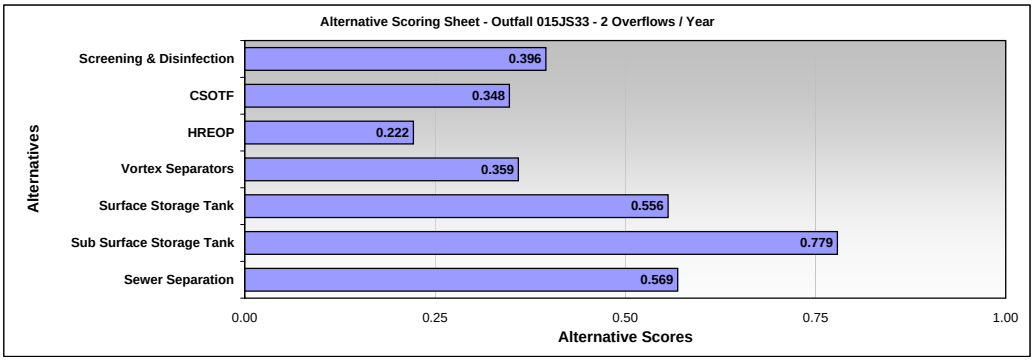
Total Score

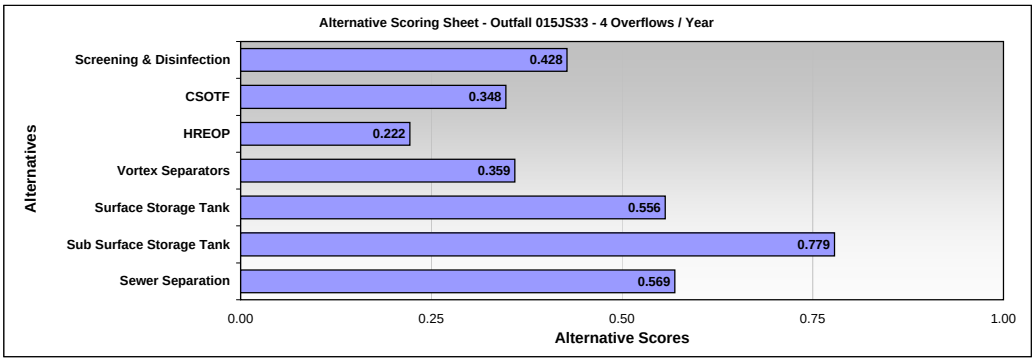
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.428** |

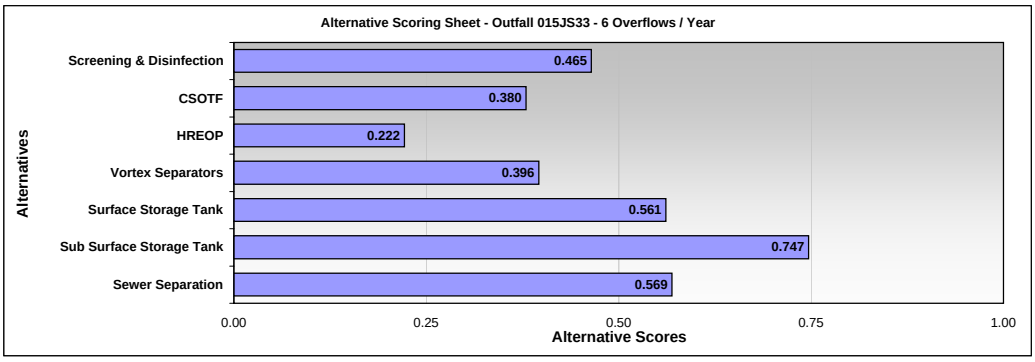
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.465** |


Alternative Scoring Sheet - Outfall 015JS33 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.501
0.348
0.222
0.327
0.678
0.795
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS33 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.348
0.222
0.359
0.605
0.795
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS33 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.348
0.222
0.359
0.556
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS33 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.428
0.348
0.222
0.359
0.556
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS33 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.465
0.380
0.222
0.396
0.561
0.747
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 80 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **12,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,848 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **12,109,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.19 | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.23 | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 57 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 38 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.24 | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **157,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 4.21 | 6.51 | = Peak Rate |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,083,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.51 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 47,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 240 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **30,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.21 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 22,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,046,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.19 | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.23 | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 57 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 38 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.24 | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,510,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.19 | 0.30 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 3 | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **449,000** | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.51 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 47,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,350 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **179,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.21 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 22,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,905,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.21 | | 6.51 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **727,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 4.63 | | 7.17 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,148,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.51 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.21 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 4.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 16 | |
| Passes / Detention (Min) | | 3 | | 15.63 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **435,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,433,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.21 | | 6.51 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 800 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 41 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 21 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | | 10,332 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.21 | | 6.51 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,083,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.51 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 15,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 750 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **73,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.21 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.21 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes / Detention (Min) | | 3 | | **16.21** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **427,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **19,719,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.21 | | 6.51 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | OK | Input by Engineer |
| Width (Ft) | | 6 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,860,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 4.63 | | 7.17 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,148,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.51 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.21 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.63 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 16 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | 15.63 | Input by Engineer / 12' SWD Basis |
| | | | | OK Detn Time | |
| Construction Cost (Disinfection / CC Tank) | $ | 435,000 | $ | 285,000 | |
| **Construction Cost (Disinfection)** | **$** | **720,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **5,524,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 25,851 | CF |
| | 0.19 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.51 | CFS |
| | 4.21 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.21 | | 6.51 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **607,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.21 | | 6.51 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,083,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.51 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 70 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **11,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.21 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes / Detention (Min) | | 3 | | **16.21** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 427,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **702,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,574,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 80 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **12,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,848 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **12,109,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.08 | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 37 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 25 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **62,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 4.19 | 6.48 | = Peak Rate |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,079,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.48 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 20,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 100 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.19 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,927,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.08 | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 37 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 25 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,168,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.08 | 0.13 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 2 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **355,000** | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.48 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 20,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,000 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **92,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.19 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,376,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.19 | | 6.48 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.60 | | 7.12 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,144,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.48 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.60 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 34 | | 17 | |
| Passes | | 3 | | **16.23** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **435,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,579,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.19 | 6.48 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 38 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 19 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 8,664 | |
| **Construction Cost (CSOTF)** | **$** | **16,392,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.19 | 6.48 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,079,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.48 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 13,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.19 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.19 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | 16 | |
| Passes | | 3 | **16.31** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **426,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,707,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.19 | | 6.48 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,856,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.60 | | 7.12 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 15 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,144,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.48 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.19 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.60 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 34 | | 17 | Input by Engineer |
| Passes | | 3 | | **16.23** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 435,000 | $ | 286,000 | |
| **Construction Cost (Disinfection)** | **$** | **721,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,516,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 11,038 | CF |
| | 0.08 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.48 | CFS |
| | 4.19 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.19 | | 6.48 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **606,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.19 | | 6.48 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,079,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.48 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 70 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **11,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.19 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes | | 3 | | **16.31** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 426,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **701,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,568,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 80 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **12,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,848 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **12,109,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.07 | 10,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.09 | 12,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 36 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 24 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 12,960 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **56,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 3.92 | 6.06 | = Peak Rate |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,037,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.06 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 18,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 90 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **14,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 3.92 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **594,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,866,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.07 | | 10,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.09 | | 12,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 36 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 24 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 12,960 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,144,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.07 | | 0.12 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **348,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 6.06 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **84,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.92 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **594,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,325,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.92 | | 6.06 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.31 | | 6.67 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,099,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.06 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.92 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **594,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.31 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | |
| Passes | | 3 | | **15.83** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **429,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,515,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.92 | 6.06 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 38 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 19 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 8,664 | |
| **Construction Cost (CSOTF)** | **$** | **16,392,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.92 | 6.06 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,037,000** | **$ 23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 6.06 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 13,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 650 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.92 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **594,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.92 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | 15 | |
| Passes | | 3 | **15.83** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **420,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **19,647,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.92 | | 6.06 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,814,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.31 | | 6.67 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,099,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.06 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.92 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **594,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 4.31 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 33 | | 16 | Input by Engineer |
| Passes | | 3 | | **15.83** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 429,000 | $ | 275,000 | |
| **Construction Cost (Disinfection)** | **$** | **704,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,399,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,987 | CF |
| | 0.07 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 6.06 | CFS |
| | 3.92 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.92 | | 6.06 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **594,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.92 | | 6.06 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,037,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 6.06 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 60 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.92 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | | 15 | |
| Passes | | 3 | | **15.83** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 420,000 | $ | 265,000 | |
| **Construction Cost (Disinfection)** | **$** | **685,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,497,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 80 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **12,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,848 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **12,109,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.05 | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.06 | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 29 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 20 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.07 | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **37,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 3.23 | 5.00 | = Peak Rate |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.4 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,924,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 5.00 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 60 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 3.23 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **562,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,696,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,073,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **328,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.00 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.23 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **562,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,179,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.23 | | 5.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.55 | | 5.50 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,977,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.23 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **562,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.55 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | |
| Passes | | 3 | | **16.37** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **413,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,342,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.23 | | 5.00 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.23 | | 5.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,924,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.00 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.23 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **562,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.23 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **16.25** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **406,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **19,481,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.23 | | 5.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,706,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.55 | | 5.50 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,977,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.23 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **562,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.55 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | Input by Engineer |
| Passes | | 3 | | **16.37** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 413,000 | $ | 255,000 | |
| **Construction Cost (Disinfection)** | **$** | **668,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,092,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,885 | CF |
| | 0.05 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 5.00 | CFS |
| | 3.23 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.23 | | 5.00 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **562,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.23 | | 5.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,924,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.00 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.23 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **16.25** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 406,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **652,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,316,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 80 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **12,000,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,848 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **12,109,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.04 | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.05 | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 27 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 19 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.06 | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **30,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 2.09 | 3.24 | = Peak Rate |
| Force Main Diameter (In) | | 10 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,726,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.24 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 11,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 60 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 2.09 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **509,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,436,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,043,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 11.9 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **320,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.24 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 550 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **57,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.09 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **509,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,083,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.09 | | 3.24 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.30 | | 3.56 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,763,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.24 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.09 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **509,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.30 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | |
| Passes | | 3 | | **16.86** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **386,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,043,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.09 | | 3.24 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 2.09 | | 3.24 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,726,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.24 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 2.09 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **509,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 2.09 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 11 | |
| Passes | | 3 | | 16.32 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **382,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **19,190,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.09 | | 3.24 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,528,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.30 | | 3.56 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,763,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.24 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.09 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **509,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.30 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | Input by Engineer |
| Passes | | 3 | | **16.86** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 386,000 | $ | 218,000 | |
| **Construction Cost (Disinfection)** | **$** | **604,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,580,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 58 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,595 | CF |
| | 0.04 | MG |
| Total Volume | 137,438 | CF |
| | 1.03 | MG |
| Peak Rate | 3.24 | CFS |
| | 2.09 | MGD |

| Capital Costs - 015JS33 / Sewershed ACSO 015JS33 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.09 | | 3.24 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **509,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.09 | | 3.24 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,726,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.24 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.09 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 11 | |
| Passes | | 3 | | **16.32** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 382,000 | $ | 209,000 | |
| **Construction Cost (Disinfection)** | **$** | **591,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,999,000** | | | |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.21 | $49,108 | 20 | 10.910 | $535,763 |
| | Tank O&M | No. Events / Yr | 58 | $36,028 | 50 | 14.484 | $521,811 |
| | | Const Cost ($) | $157,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,788 | 20 | 10.910 | $84,963 |
| | Odor Control O&M | Capacity (cfm) | 240 | $840 | 20 | 10.910 | $9,164 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,231 |
| | | | **Total Annual O&M** | **$94,000** | | **Total PW O&M** | **$1,162,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.19 | $6,271 | 20 | 10.910 | $68,414 |
| | Tank O&M | No. Events / Yr | 58 | $39,410 | 50 | 14.484 | $570,801 |
| | | Const Cost ($) | $1,510,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,788 | 20 | 10.910 | $84,963 |
| | Odor Control O&M | Capacity (cfm) | 2,350 | $8,225 | 20 | 10.910 | $89,734 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,970 |
| | | | **Total Annual O&M** | **$62,000** | | **Total PW O&M** | **$818,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.21 | $49,108 | 20 | 10.910 | $535,763 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.21 | $474 | 50 | 14.484 | $6,859 |
| | Screening O&M | Flow Rate (mgd) | 4.21 | $7,788 | 20 | 10.910 | $84,963 |
| | Disinfection O&M | Flow Rate (mgd) | 4.21 | $38,599 | 20 | 10.910 | $421,116 |
| | Odor Control O&M | Capacity (cfm) | 750.00 | $2,625 | 20 | 10.910 | $28,639 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,510 |
| | | | **Total Annual O&M** | **$99,000** | | **Total PW O&M** | **$1,089,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.63 | $52,337 | 20 | 10.910 | $570,988 |
| | HREP O&M | Flow Rate (mgd) | 4.21 | $54,241 | 20 | 10.910 | $591,767 |
| | Screening O&M | Flow Rate (mgd) | 4.21 | $7,788 | 20 | 10.910 | $84,963 |
| | Disinfection O&M | Flow Rate (mgd) | 4.63 | $40,907 | 20 | 10.910 | $446,291 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,698 |
| | | | **Total Annual O&M** | **$156,000** | | **Total PW O&M** | **$1,715,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.63 | $52,337 | 20 | 10.910 | $570,988 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.21 | $474 | 20 | 10.910 | $5,167 |
| | Screening O&M | Flow Rate (mgd) | 4.21 | $7,788 | 20 | 10.910 | $84,963 |
| | Disinfection O&M | Flow Rate (mgd) | 4.63 | $40,907 | 20 | 10.910 | $446,291 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,919 |
| | | | **Total Annual O&M** | **$107,000** | | **Total PW O&M** | **$1,176,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.21 | $49,108 | 20 | 10.910 | $535,763 |
| | Screening O&M | Flow Rate (mgd) | 4.21 | $7,788 | 20 | 10.910 | $84,963 |
| | Disinfection O&M | Flow Rate (mgd) | 4.21 | $38,599 | 20 | 10.910 | $421,116 |
| | Odor Control O&M | Capacity (cfm) | 70.00 | $245 | 20 | 10.910 | $2,673 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,341 |
| | | | **Total Annual O&M** | **$96,000** | | **Total PW O&M** | **$1,056,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.19 | $48,918 | 20 | 10.910 | $533,692 |
| | Tank O&M | No. Events / Yr | 58 | $35,790 | 50 | 14.484 | $518,371 |
| | | Const Cost ($) | $62,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,786 | 20 | 10.910 | $84,941 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,171 |
| | | | **Total Annual O&M** | **$93,000** | | **Total PW O&M** | **$1,151,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.08 | $3,551 | 20 | 10.910 | $38,746 |
| | Tank O&M | No. Events / Yr | 58 | $38,555 | 50 | 14.484 | $558,418 |
| | | Const Cost ($) | $1,168,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,786 | 20 | 10.910 | $84,941 |
| | Odor Control O&M | Capacity (cfm) | 1,000 | $3,500 | 20 | 10.910 | $38,185 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,347 |
| | | | **Total Annual O&M** | **$54,000** | | **Total PW O&M** | **$724,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.19 | $48,918 | 20 | 10.910 | $533,692 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.19 | $471 | 50 | 14.484 | $6,820 |
| | Screening O&M | Flow Rate (mgd) | 4.19 | $7,786 | 20 | 10.910 | $84,941 |
| | Disinfection O&M | Flow Rate (mgd) | 4.19 | $38,463 | 20 | 10.910 | $419,632 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,466 |
| | | | **Total Annual O&M** | **$98,000** | | **Total PW O&M** | **$1,081,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.60 | $52,134 | 20 | 10.910 | $568,781 |
| | HREP O&M | Flow Rate (mgd) | 4.19 | $54,057 | 20 | 10.910 | $589,753 |
| | Screening O&M | Flow Rate (mgd) | 4.19 | $7,786 | 20 | 10.910 | $84,941 |
| | Disinfection O&M | Flow Rate (mgd) | 4.60 | $40,763 | 20 | 10.910 | $444,718 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,668 |
| | | | **Total Annual O&M** | **$156,000** | | **Total PW O&M** | **$1,709,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.60 | $52,134 | 20 | 10.910 | $568,781 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.19 | $471 | 20 | 10.910 | $5,137 |
| | Screening O&M | Flow Rate (mgd) | 4.19 | $7,786 | 20 | 10.910 | $84,941 |
| | Disinfection O&M | Flow Rate (mgd) | 4.60 | $40,763 | 20 | 10.910 | $444,718 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,579 |
| | | | **Total Annual O&M** | **$102,000** | | **Total PW O&M** | **$1,115,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.19 | $48,918 | 20 | 10.910 | $533,692 |
| | Screening O&M | Flow Rate (mgd) | 4.19 | $7,786 | 20 | 10.910 | $84,941 |
| | Disinfection O&M | Flow Rate (mgd) | 4.19 | $38,463 | 20 | 10.910 | $419,632 |
| | Odor Control O&M | Capacity (cfm) | 70.00 | $245 | 20 | 10.910 | $2,673 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,319 |
| | | | **Total Annual O&M** | **$96,000** | | **Total PW O&M** | **$1,052,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.92 | $46,815 | 20 | 10.910 | $510,753 |
| | Tank O&M | No. Events / Yr | 58 | $35,775 | 50 | 14.484 | $518,153 |
| | | Const Cost ($) | $56,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,763 | 20 | 10.910 | $84,696 |
| | Odor Control O&M | Capacity (cfm) | 90 | $315 | 20 | 10.910 | $3,437 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,965 |
| | | | **Total Annual O&M** | **$91,000** | | **Total PW O&M** | **$1,127,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.07 | $3,322 | 20 | 10.910 | $36,240 |
| | Tank O&M | No. Events / Yr | 58 | $38,495 | 50 | 14.484 | $557,549 |
| | | Const Cost ($) | $1,144,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,763 | 20 | 10.910 | $84,696 |
| | Odor Control O&M | Capacity (cfm) | 900 | $3,150 | 20 | 10.910 | $34,366 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,264 |
| | | | **Total Annual O&M** | **$53,000** | | **Total PW O&M** | **$716,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.92 | $46,815 | 20 | 10.910 | $510,753 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.92 | $441 | 50 | 14.484 | $6,386 |
| | Screening O&M | Flow Rate (mgd) | 3.92 | $7,763 | 20 | 10.910 | $84,696 |
| | Disinfection O&M | Flow Rate (mgd) | 3.92 | $36,953 | 20 | 10.910 | $403,153 |
| | Odor Control O&M | Capacity (cfm) | 650.00 | $2,275 | 20 | 10.910 | $24,820 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,246 |
| | | | **Total Annual O&M** | **$95,000** | | **Total PW O&M** | **$1,041,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 4.31 | $49,893 | 20 | 10.910 | $544,334 |
| | HREP O&M | Flow Rate (mgd) | 3.92 | $52,006 | 20 | 10.910 | $567,381 |
| | Screening O&M | Flow Rate (mgd) | 3.92 | $7,763 | 20 | 10.910 | $84,696 |
| | Disinfection O&M | Flow Rate (mgd) | 4.31 | $39,162 | 20 | 10.910 | $427,255 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,321 |
| | | | **Total Annual O&M** | **$150,000** | | **Total PW O&M** | **$1,644,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 4.31 | $49,893 | 20 | 10.910 | $544,334 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.92 | $441 | 20 | 10.910 | $4,810 |
| | Screening O&M | Flow Rate (mgd) | 3.92 | $7,763 | 20 | 10.910 | $84,696 |
| | Disinfection O&M | Flow Rate (mgd) | 4.31 | $39,162 | 20 | 10.910 | $427,255 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,346 |
| | | | **Total Annual O&M** | **$98,000** | | **Total PW O&M** | **$1,072,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.92 | $46,815 | 20 | 10.910 | $510,753 |
| | Screening O&M | Flow Rate (mgd) | 3.92 | $7,763 | 20 | 10.910 | $84,696 |
| | Disinfection O&M | Flow Rate (mgd) | 3.92 | $36,953 | 20 | 10.910 | $403,153 |
| | Odor Control O&M | Capacity (cfm) | 60.00 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,096 |
| | | | **Total Annual O&M** | **$92,000** | | **Total PW O&M** | **$1,012,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.23 | $41,141 | 20 | 10.910 | $448,845 |
| | Tank O&M | No. Events / Yr | 58 | $35,728 | 50 | 14.484 | $517,465 |
| | | Const Cost ($) | $37,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,705 | 20 | 10.910 | $84,063 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,406 |
| | | | **Total Annual O&M** | **$85,000** | | **Total PW O&M** | **$1,062,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,591 | 20 | 10.910 | $28,267 |
| | Tank O&M | No. Events / Yr | 58 | $38,318 | 50 | 14.484 | $554,978 |
| | | Const Cost ($) | $1,073,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,705 | 20 | 10.910 | $84,063 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,033 |
| | | | **Total Annual O&M** | **$51,000** | | **Total PW O&M** | **$693,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.23 | $41,141 | 20 | 10.910 | $448,845 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.23 | $363 | 50 | 14.484 | $5,263 |
| | Screening O&M | Flow Rate (mgd) | 3.23 | $7,705 | 20 | 10.910 | $84,063 |
| | Disinfection O&M | Flow Rate (mgd) | 3.23 | $32,846 | 20 | 10.910 | $358,347 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,649 |
| | | | **Total Annual O&M** | **$85,000** | | **Total PW O&M** | **$930,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.55 | $43,846 | 20 | 10.910 | $478,356 |
| | HREP O&M | Flow Rate (mgd) | 3.23 | $46,415 | 20 | 10.910 | $506,384 |
| | Screening O&M | Flow Rate (mgd) | 3.23 | $7,705 | 20 | 10.910 | $84,063 |
| | Disinfection O&M | Flow Rate (mgd) | 3.55 | $34,809 | 20 | 10.910 | $379,769 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,383 |
| | | | **Total Annual O&M** | **$133,000** | | **Total PW O&M** | **$1,466,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.55 | $43,846 | 20 | 10.910 | $478,356 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.23 | $363 | 20 | 10.910 | $3,964 |
| | Screening O&M | Flow Rate (mgd) | 3.23 | $7,705 | 20 | 10.910 | $84,063 |
| | Disinfection O&M | Flow Rate (mgd) | 3.55 | $34,809 | 20 | 10.910 | $379,769 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,718 |
| | | | **Total Annual O&M** | **$87,000** | | **Total PW O&M** | **$957,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.23 | $41,141 | 20 | 10.910 | $448,845 |
| | Screening O&M | Flow Rate (mgd) | 3.23 | $7,705 | 20 | 10.910 | $84,063 |
| | Disinfection O&M | Flow Rate (mgd) | 3.23 | $32,846 | 20 | 10.910 | $358,347 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,507 |
| | | | **Total Annual O&M** | **$82,000** | | **Total PW O&M** | **$904,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.09 | $30,772 | 20 | 10.910 | $335,723 |
| | Tank O&M | No. Events / Yr | 58 | $35,710 | 50 | 14.484 | $517,212 |
| | | Const Cost ($) | $30,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,610 | 20 | 10.910 | $83,021 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,454 |
| | | | **Total Annual O&M** | **$75,000** | | **Total PW O&M** | **$947,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,255 | 20 | 10.910 | $24,606 |
| | Tank O&M | No. Events / Yr | 58 | $38,243 | 50 | 14.484 | $553,892 |
| | | Const Cost ($) | $1,043,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,610 | 20 | 10.910 | $83,021 |
| | Odor Control O&M | Capacity (cfm) | 550 | $1,925 | 20 | 10.910 | $21,002 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,845 |
| | | | **Total Annual O&M** | **$51,000** | | **Total PW O&M** | **$685,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.09 | $30,772 | 20 | 10.910 | $335,723 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.09 | $235 | 50 | 14.484 | $3,408 |
| | Screening O&M | Flow Rate (mgd) | 2.09 | $7,610 | 20 | 10.910 | $83,021 |
| | Disinfection O&M | Flow Rate (mgd) | 2.09 | $25,205 | 20 | 10.910 | $274,983 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,588 |
| | | | **Total Annual O&M** | **$66,000** | | **Total PW O&M** | **$722,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.30 | $32,795 | 20 | 10.910 | $357,796 |
| | HREP O&M | Flow Rate (mgd) | 2.09 | $35,945 | 20 | 10.910 | $392,163 |
| | Screening O&M | Flow Rate (mgd) | 2.09 | $7,610 | 20 | 10.910 | $83,021 |
| | Disinfection O&M | Flow Rate (mgd) | 2.30 | $26,712 | 20 | 10.910 | $291,422 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,808 |
| | | | **Total Annual O&M** | **$104,000** | | **Total PW O&M** | **$1,140,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.30 | $32,795 | 20 | 10.910 | $357,796 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.09 | $235 | 20 | 10.910 | $2,567 |
| | Screening O&M | Flow Rate (mgd) | 2.09 | $7,610 | 20 | 10.910 | $83,021 |
| | Disinfection O&M | Flow Rate (mgd) | 2.30 | $26,712 | 20 | 10.910 | $291,422 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,627 |
| | | | **Total Annual O&M** | **$68,000** | | **Total PW O&M** | **$744,000** |

| ACSO 015JS33 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.09 | $30,772 | 20 | 10.910 | $335,723 |
| | Screening O&M | Flow Rate (mgd) | 2.09 | $7,610 | 20 | 10.910 | $83,021 |
| | Disinfection O&M | Flow Rate (mgd) | 2.09 | $25,205 | 20 | 10.910 | $274,983 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,482 |
| | | | **Total Annual O&M** | **$64,000** | | **Total PW O&M** | **$704,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.1 | $12,109,000 | $0 |
| 1 | $12.1 | $12,109,000 | $0 |
| 2 | $12.1 | $12,109,000 | $0 |
| 4 | $12.1 | $12,109,000 | $0 |
| 6 | $12.1 | $12,109,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.7 | $2,905,000 | $818,000 |
| 1 | $3.1 | $2,376,000 | $724,000 |
| 2 | $3.0 | $2,325,000 | $716,000 |
| 4 | $2.9 | $2,179,000 | $693,000 |
| 6 | $2.8 | $2,083,000 | $685,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.2 | $3,046,000 | $1,162,000 |
| 1 | $4.1 | $2,927,000 | $1,151,000 |
| 2 | $4.0 | $2,866,000 | $1,127,000 |
| 4 | $3.8 | $2,696,000 | $1,062,000 |
| 6 | $3.4 | $2,436,000 | $947,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.6 | $4,433,000 | $1,176,000 |
| 1 | $4.7 | $3,579,000 | $1,115,000 |
| 2 | $4.6 | $3,515,000 | $1,072,000 |
| 4 | $4.3 | $3,342,000 | $957,000 |
| 6 | $3.8 | $3,043,000 | $744,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.2 | $5,524,000 | $1,715,000 |
| 1 | $7.2 | $5,516,000 | $1,709,000 |
| 2 | $7.0 | $5,399,000 | $1,644,000 |
| 4 | $6.6 | $5,092,000 | $1,466,000 |
| 6 | $5.7 | $4,580,000 | $1,140,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $20.8 | $19,719,000 | $1,089,000 |
| 1 | $20.8 | $19,707,000 | $1,081,000 |
| 2 | $20.7 | $19,647,000 | $1,041,000 |
| 4 | $20.4 | $19,481,000 | $930,000 |
| 6 | $19.9 | $19,190,000 | $722,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.6 | $3,574,000 | $1,056,000 |
| 1 | $4.6 | $3,568,000 | $1,052,000 |
| 2 | $4.5 | $3,497,000 | $1,012,000 |
| 4 | $4.2 | $3,316,000 | $904,000 |
| 6 | $3.7 | $2,999,000 | $704,000 |

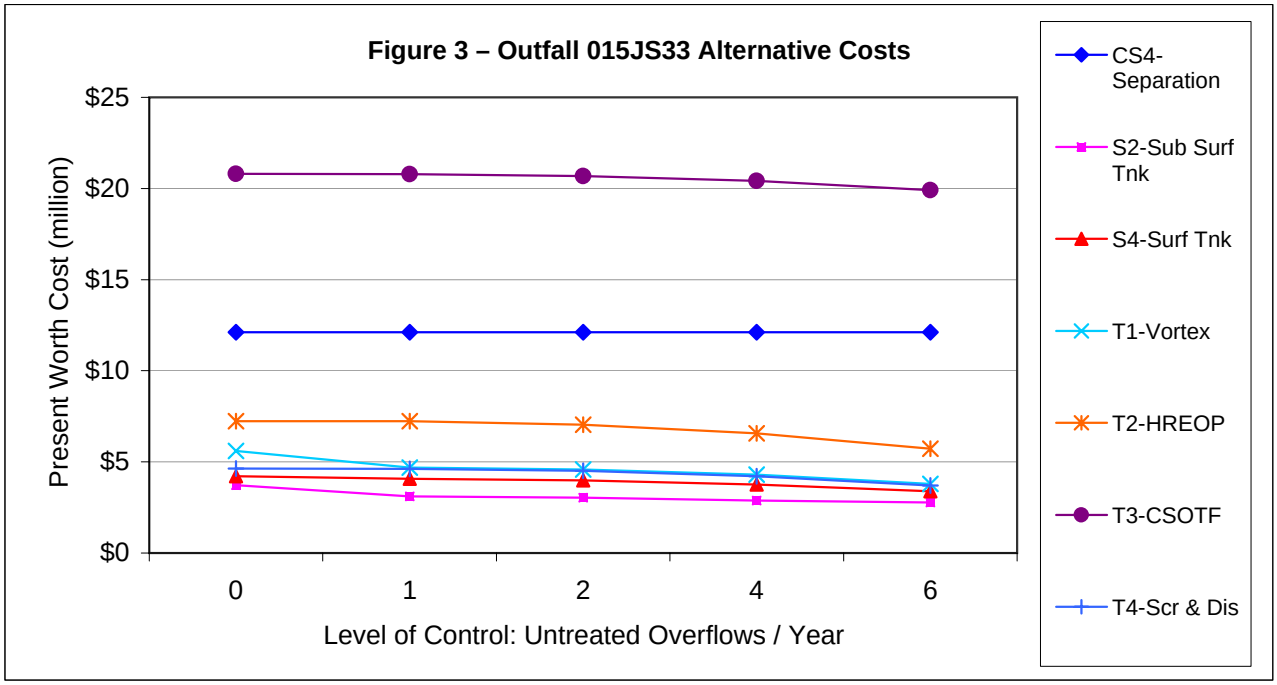
Figure 3 – Outfall 015JS33 Alternative Costs
$25
$20
$15
$10
$5
$0
Present Worth Cost (million)
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015JS33 |
| **Location Name** | S-33 |
| **Model ID** | ADC 015JS33-W.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015JS33 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 58 | |
| Peak Volume: | 25,851 | $ft^3$ |
| | 0.19 | MG |
| Total Volume: | 137,438 | $ft^3$ |
| | 1.03 | MG |
| Peak Rate: | 6.51 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 13:07 | 1374 | 1/5/2005 14:45 | 25851.39 | 193.381 | 0 | 1.00 | 23 |
| 5/13/2005 22:30 | 146 | 5/13/2005 22:45 | 11038.32 | 82.572 | 1 | 6.06 | 2 |
| 8/20/2005 18:15 | 65 | 8/20/2005 18:30 | 9987.13 | 74.709 | 2 | 6.48 | 1 |
| 7/26/2005 19:45 | 40 | 7/26/2005 20:00 | 7883.41 | 58.972 | 3 | 6.51 | 0 |
| 11/29/2005 6:45 | 410 | 11/29/2005 7:00 | 6885.18 | 51.505 | 4 | 0.92 | 25 |
| 4/23/2005 3:40 | 64 | 4/23/2005 4:00 | 5698.31 | 42.626 | 5 | 5.00 | 3 |
| 7/5/2005 16:30 | 43 | 7/5/2005 16:45 | 5594.57 | 41.850 | 6 | 5.00 | 4 |
| 1/11/2005 8:45 | 559 | 1/11/2005 16:45 | 5015.28 | 37.517 | 7 | 0.68 | 28 |
| 3/28/2005 9:07 | 620 | 3/28/2005 19:00 | 5004.96 | 37.440 | 8 | 1.05 | 21 |
| 7/15/2005 17:40 | 44 | 7/15/2005 18:00 | 4586.29 | 34.308 | 9 | 3.30 | 5 |
| 11/14/2005 21:50 | 375 | 11/15/2005 3:45 | 4211.86 | 31.507 | 10 | 1.01 | 22 |
| 7/21/2005 14:20 | 34 | 7/21/2005 14:45 | 3016.36 | 22.564 | 11 | 2.90 | 7 |
| 11/9/2005 19:30 | 25 | 11/9/2005 19:45 | 2765.25 | 20.685 | 12 | 3.24 | 6 |
| 5/11/2005 22:35 | 93 | 5/11/2005 23:00 | 2398.13 | 17.939 | 13 | 1.39 | 14 |
| 1/3/2005 12:59 | 463 | 1/3/2005 13:45 | 2397.57 | 17.935 | 14 | 0.35 | 38 |
| 6/11/2005 17:35 | 34 | 6/11/2005 17:45 | 2166.72 | 16.208 | 15 | 1.77 | 12 |
| 9/29/2005 5:26 | 51 | 9/29/2005 5:45 | 2105.15 | 15.748 | 16 | 2.35 | 8 |
| 10/22/2005 3:40 | 209 | 10/22/2005 7:00 | 2002.64 | 14.981 | 17 | 1.09 | 19 |
| 1/5/2005 2:38 | 264 | 1/5/2005 4:45 | 1889.76 | 14.136 | 18 | 0.34 | 39 |
| 8/27/2005 15:15 | 25 | 8/27/2005 15:30 | 1761.95 | 13.180 | 19 | 2.16 | 9 |
| 2/20/2005 19:45 | 62 | 2/20/2005 20:30 | 1759.73 | 13.164 | 20 | 0.82 | 27 |
| 1/14/2005 0:08 | 166 | 1/14/2005 2:15 | 1685.57 | 12.609 | 21 | 0.58 | 31 |
| 1/12/2005 0:51 | 59 | 1/12/2005 1:30 | 1678.17 | 12.554 | 22 | 0.86 | 26 |
| 2/14/2005 7:05 | 779 | 2/14/2005 19:45 | 1644.69 | 12.303 | 23 | 0.24 | 46 |
| 5/23/2005 16:20 | 32 | 5/23/2005 16:30 | 1630.38 | 12.196 | 24 | 1.94 | 10 |
| 2/9/2005 15:24 | 98 | 2/9/2005 16:45 | 1459.74 | 10.920 | 25 | 1.28 | 17 |
| 7/17/2005 16:20 | 33 | 7/17/2005 16:30 | 1383.11 | 10.346 | 26 | 1.27 | 18 |
| 5/14/2005 16:05 | 63 | 5/14/2005 16:15 | 1323.77 | 9.902 | 27 | 1.60 | 13 |
| 4/2/2005 5:50 | 246 | 4/2/2005 6:45 | 1319.89 | 9.873 | 28 | 0.35 | 37 |
| 1/8/2005 4:44 | 70 | 1/8/2005 5:15 | 1013.65 | 7.583 | 29 | 0.45 | 32 |
| 12/15/2005 13:36 | 407 | 12/15/2005 14:00 | 1005.26 | 7.520 | 30 | 0.61 | 30 |
| 5/28/2005 8:35 | 62 | 5/28/2005 9:00 | 993.22 | 7.430 | 31 | 0.33 | 42 |
| 7/25/2005 13:20 | 19 | 7/25/2005 13:30 | 961.55 | 7.193 | 32 | 1.84 | 11 |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/29/2005 11:35 | 138 | 8/29/2005 13:45 | 947.95 | 7.091 | 33 | 0.97 | 24 |
| 11/9/2005 4:15 | 24 | 11/9/2005 4:30 | 924.37 | 6.915 | 34 | 1.37 | 15 |
| 11/16/2005 4:05 | 24 | 11/16/2005 4:15 | 841.05 | 6.291 | 35 | 1.36 | 16 |
| 10/7/2005 10:20 | 43 | 10/7/2005 10:45 | 657.39 | 4.918 | 36 | 0.44 | 33 |
| 6/28/2005 18:05 | 18 | 6/28/2005 18:15 | 441.20 | 3.300 | 37 | 1.08 | 20 |
| 9/26/2005 9:21 | 29 | 9/26/2005 9:45 | 373.00 | 2.790 | 38 | 0.31 | 44 |
| 8/26/2005 20:50 | 23 | 8/26/2005 21:00 | 358.59 | 2.682 | 39 | 0.62 | 29 |
| 6/14/2005 19:01 | 26 | 6/14/2005 19:15 | 293.29 | 2.194 | 40 | 0.38 | 35 |
| 10/22/2005 16:16 | 27 | 10/22/2005 16:30 | 274.13 | 2.051 | 41 | 0.34 | 40 |
| 10/21/2005 19:05 | 26 | 10/21/2005 19:15 | 253.45 | 1.896 | 42 | 0.34 | 41 |
| 4/22/2005 16:03 | 125 | 4/22/2005 18:00 | 252.97 | 1.892 | 43 | 0.24 | 45 |
| 5/7/2005 13:17 | 18 | 5/7/2005 13:30 | 234.63 | 1.755 | 44 | 0.39 | 34 |
| 10/21/2005 7:20 | 24 | 10/21/2005 7:30 | 227.91 | 1.705 | 45 | 0.31 | 43 |
| 10/25/2005 1:47 | 124 | 10/25/2005 3:45 | 226.63 | 1.695 | 46 | 0.15 | 49 |
| 3/23/2005 12:12 | 36 | 3/23/2005 12:45 | 220.41 | 1.649 | 47 | 0.13 | 50 |
| 11/1/2005 16:07 | 27 | 11/1/2005 16:30 | 175.32 | 1.312 | 48 | 0.17 | 47 |
| 9/16/2005 21:35 | 14 | 9/16/2005 21:45 | 159.68 | 1.194 | 49 | 0.36 | 36 |
| 3/27/2005 16:56 | 21 | 3/27/2005 17:05 | 92.98 | 0.696 | 50 | 0.10 | 52 |
| 6/3/2005 9:00 | 18 | 6/3/2005 9:15 | 88.63 | 0.663 | 51 | 0.11 | 51 |
| 4/20/2005 23:07 | 13 | 4/20/2005 23:15 | 66.79 | 0.500 | 52 | 0.16 | 48 |
| 2/16/2005 8:01 | 17 | 2/16/2005 8:15 | 64.21 | 0.480 | 53 | 0.09 | 54 |
| 3/23/2005 2:38 | 113 | 3/23/2005 2:45 | 54.16 | 0.405 | 54 | 0.08 | 55 |
| 4/27/2005 0:38 | 11 | 4/27/2005 0:45 | 40.22 | 0.301 | 55 | 0.09 | 53 |
| 12/25/2005 12:41 | 10 | 12/25/2005 12:45 | 26.92 | 0.201 | 56 | 0.06 | 56 |
| 4/1/2005 19:39 | 9 | 4/1/2005 19:45 | 22.93 | 0.172 | 57 | 0.05 | 57 |

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# Region 1

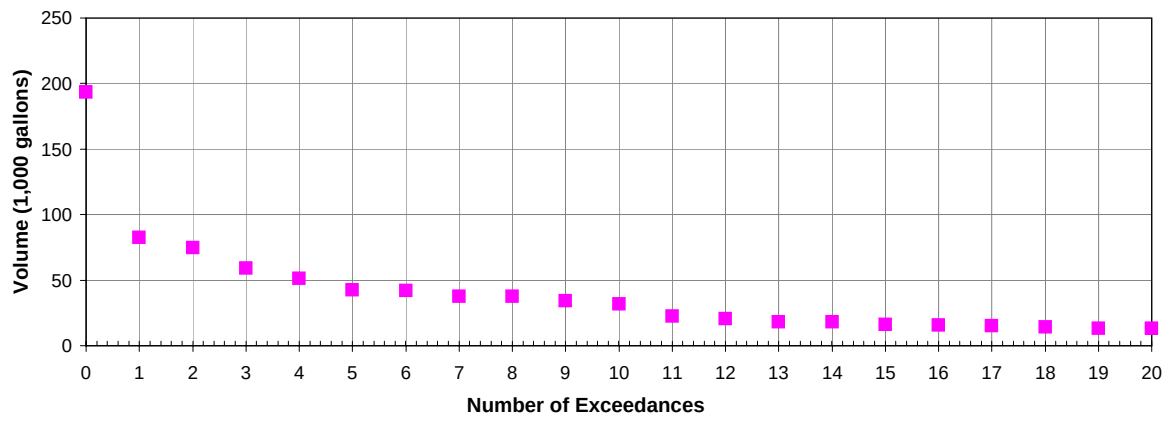
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015JS33 |
| **Location Name** | S-33 |
| **Model ID** | ADC 015JS33-W.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015JS33 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

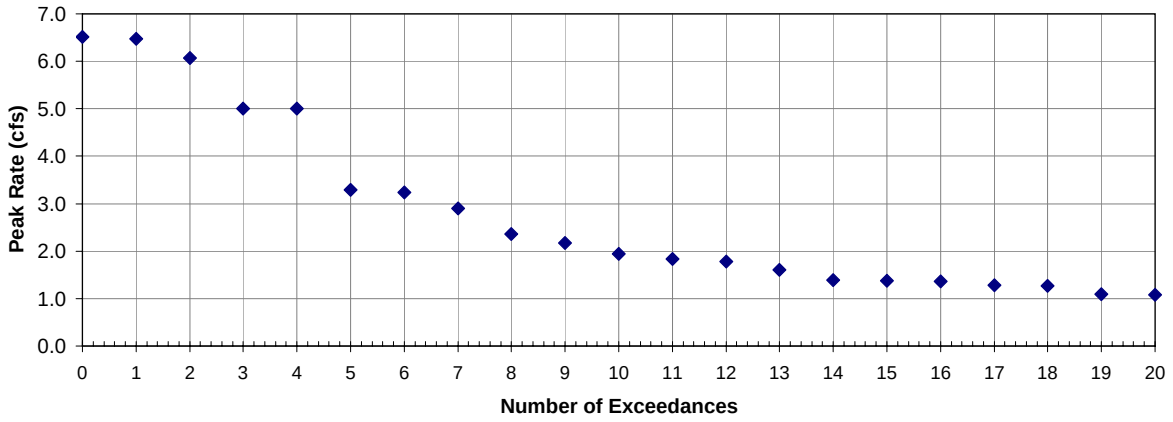
**Results Summary**

| | |
|---|---|
| Number of Events: | 58 |
| Peak Volume: | 25,851 $ft^3$ |
| | 0.19 MG |
| Total Volume: | 137,438 $ft^3$ |
| | 1.03 MG |
| Peak Rate: | 6.51 cfs |

### Figure 1 - Outfall 015JS33 CSO Volume




### Figure 2 - Outfall 015JS33 CSO Peak Flow Rate



## D.26.5 0-14 – SAW MILL RUN INTERCEPTOR SEWERSHED – S-33 – NPDES # 015JS33

### Description of Outfall

Outfall 015JS33 conveys overflows from the ALCOSAN diversion chamber 015JS33 to Saw Mill Run, and ultimately into the Ohio River. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run, near Saw Mill Run Boulevard and Crane Avenue. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 015JS33 Sewershed (S-33) consists of 80 acres, or approximately 1.7% of the total service area. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 015JS33 typically experiences 58 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015JS33 is approximately 0.19 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015JS33 is approximately 6.51 CFS. *Figure 1 – Outfall 015JS33 CSO Volume* and *Figure 2 – Outfall 015JS33 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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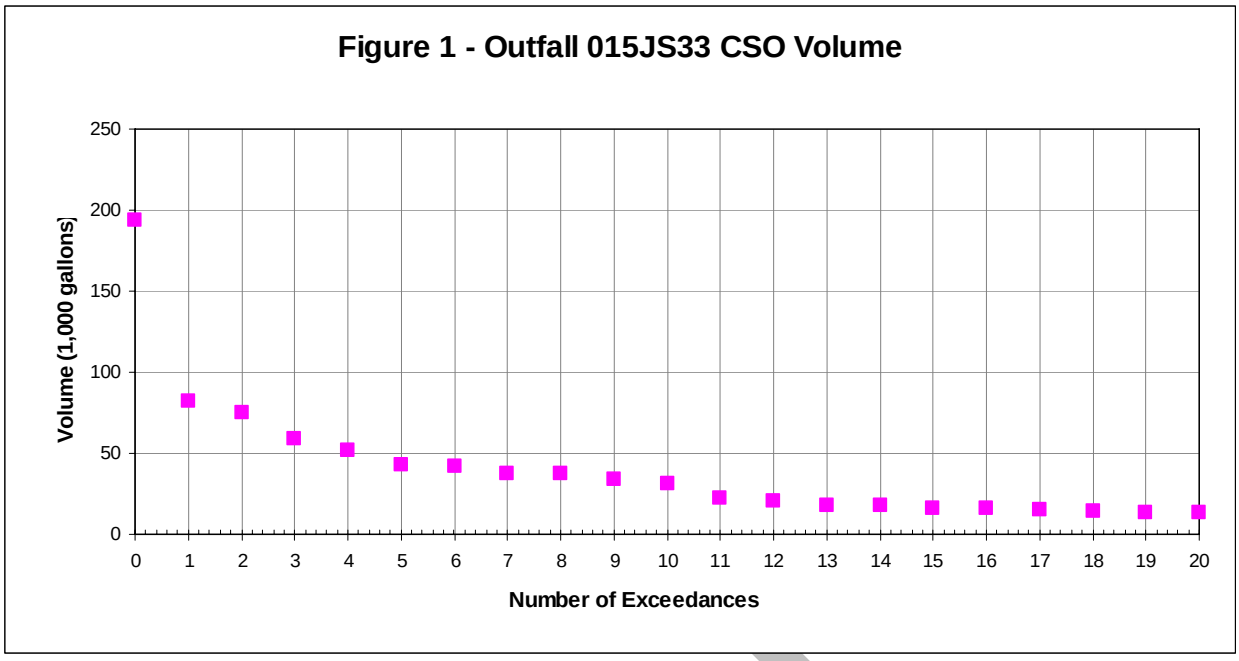


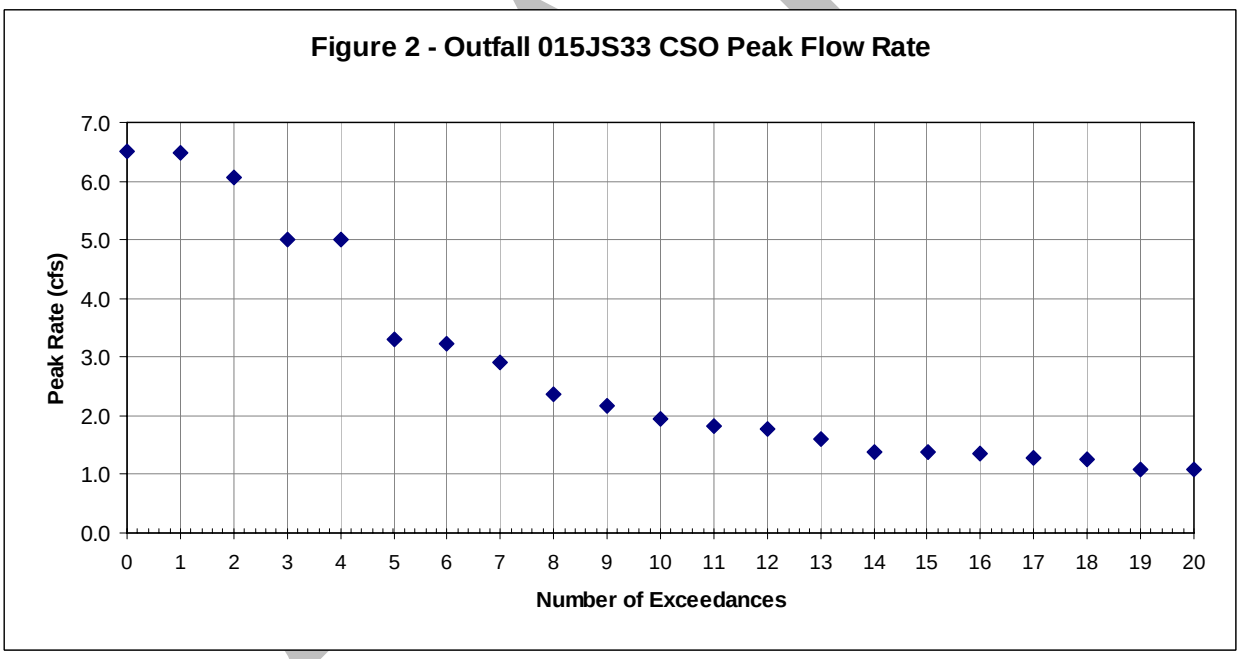


There appears to be a limited amount of available space for potential storage or treatment facilities west of the intersection of Saw Mill Run Boulevard and Crane Avenue, adjacent to Saw Mill Run. The site is generally bounded by Saw Mill Run to the east, Crane Avenue to the south, railroad tracks to the west and private development to the north.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015JS33. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-015JS33: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-015JS33: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015JS33: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-015JS33: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015JS33: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015JS33: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-015JS33: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

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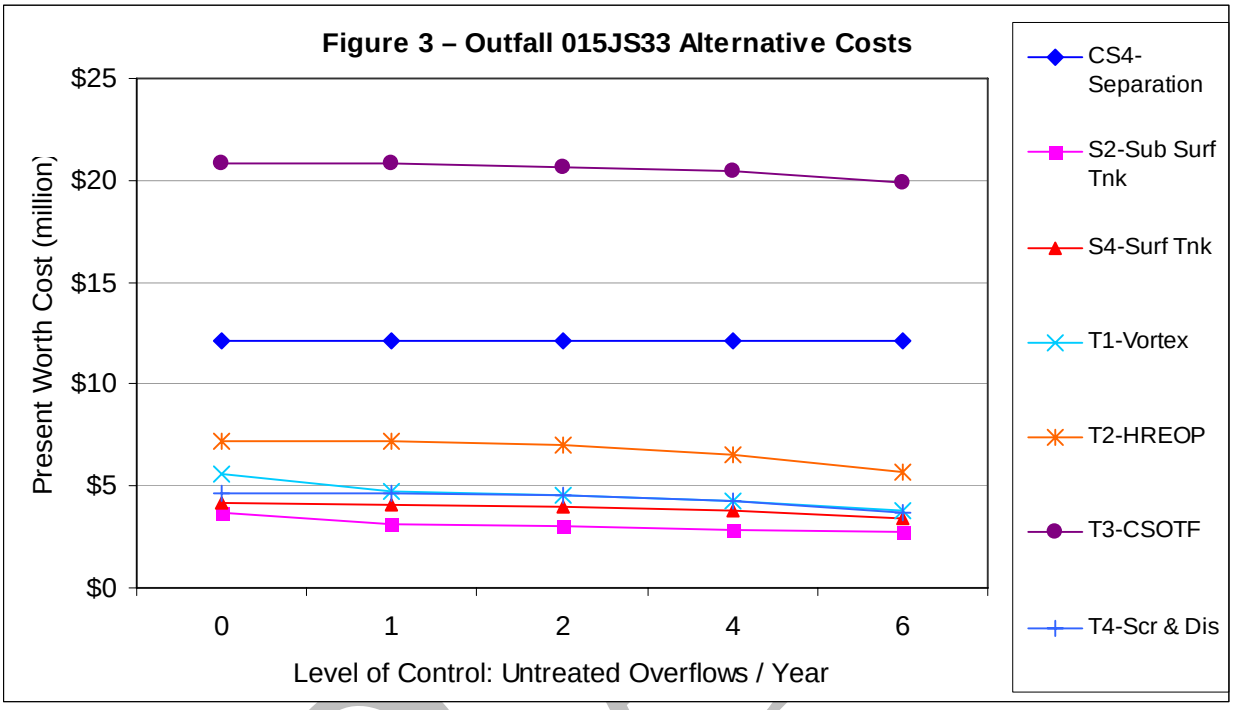
*Figure 3 – Outfall 015JS33 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-015JS33: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.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**Significant Issues**

It appears that sufficient space exists to construct a sub-surface storage facility for all control levels.

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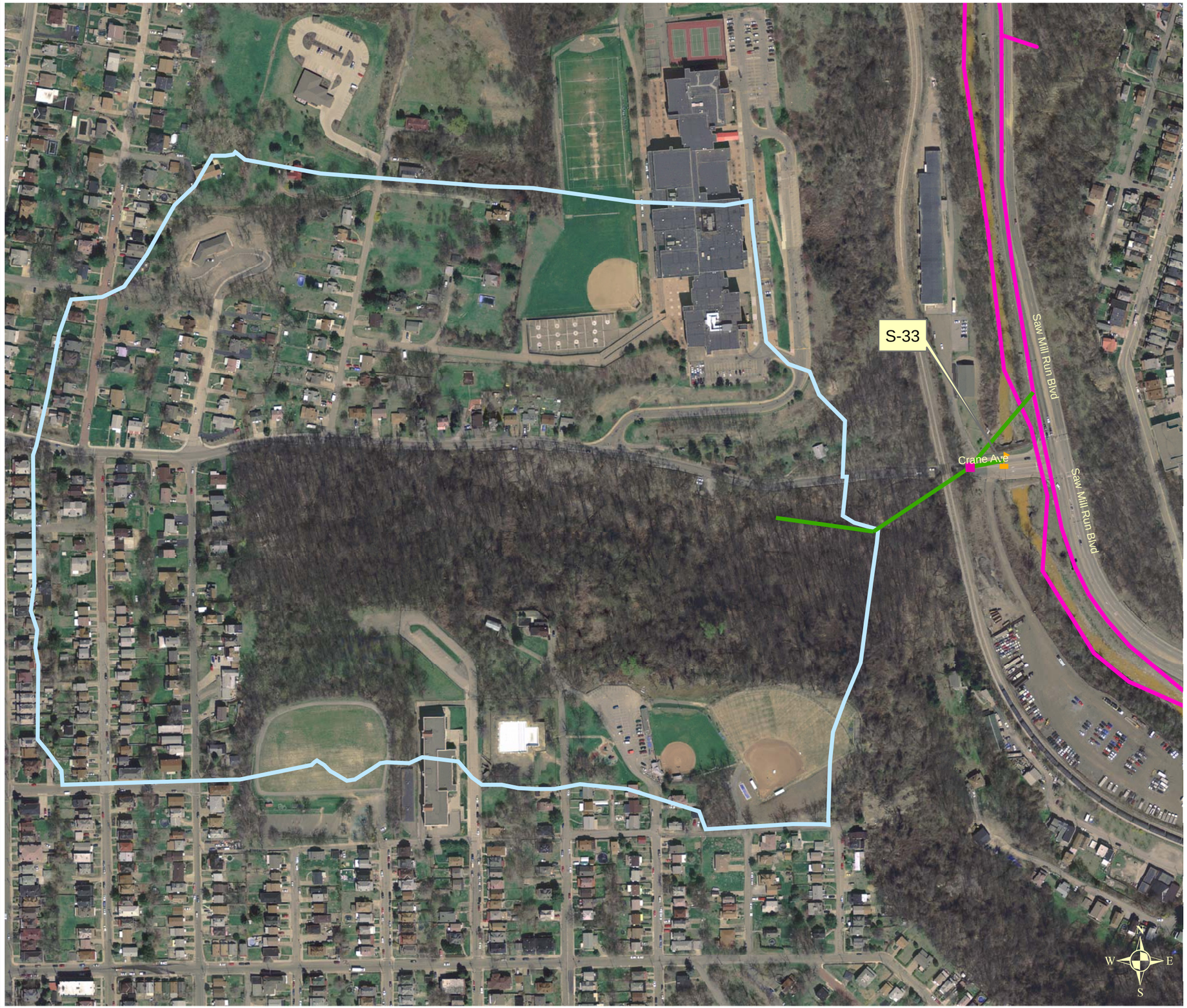


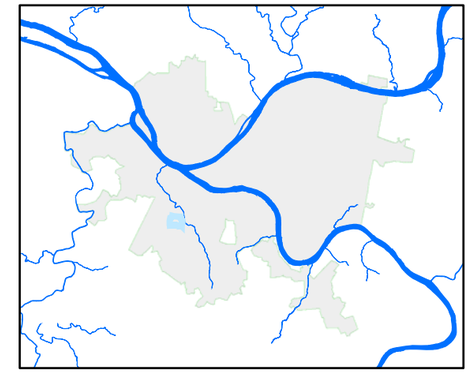

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

300 0 300 Feet

# Attachment 1
# S-33
# Tributary Area Map
# Sawmillrun Interceptor Sewershed

CSO Controls Alternatives

PWSA

SW-D-0214.pdf

# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 80 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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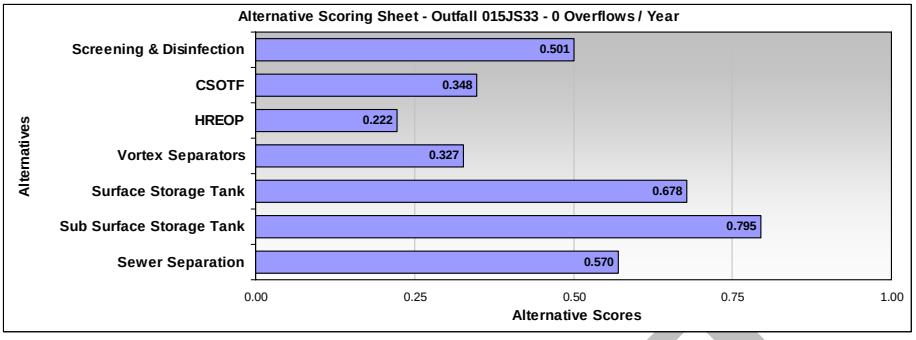
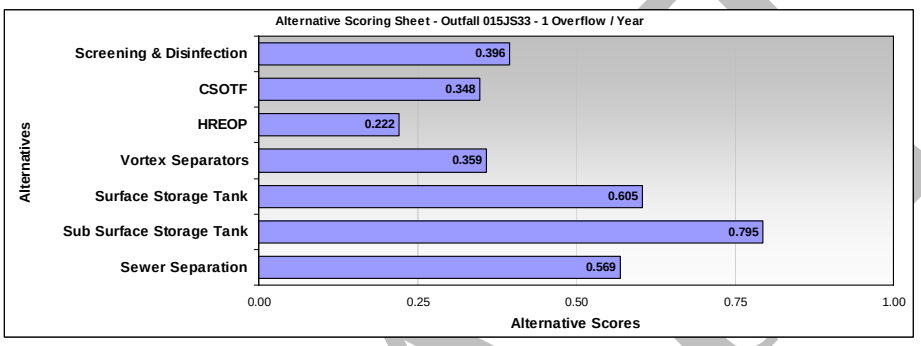
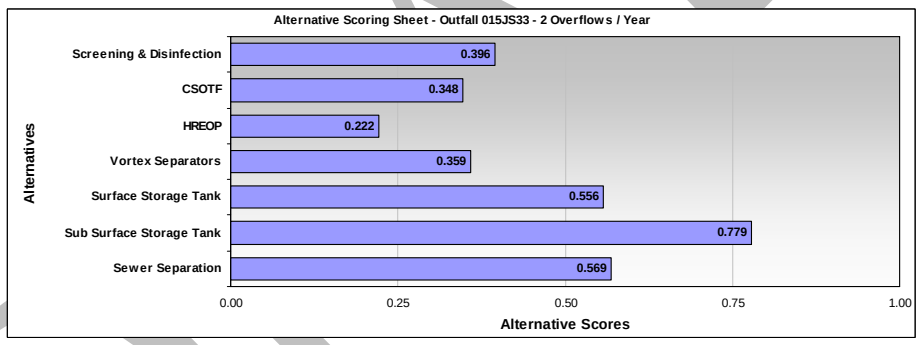
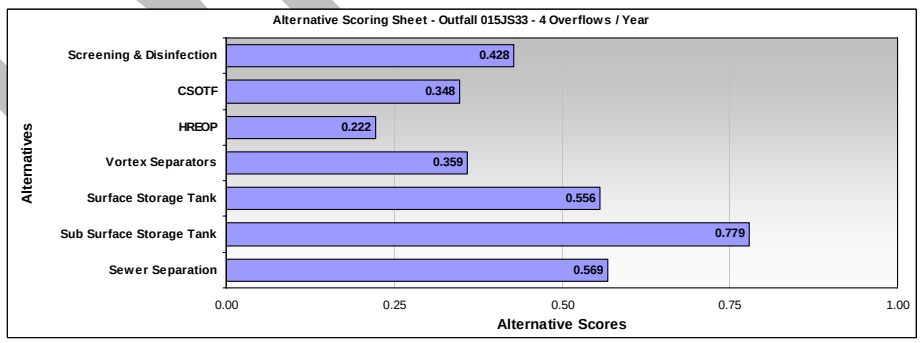
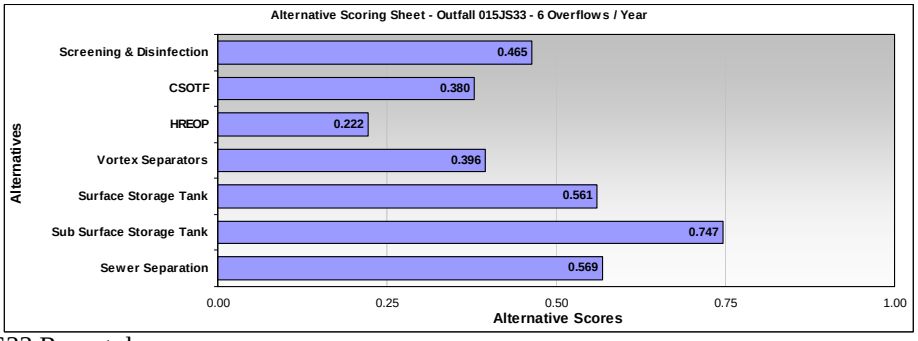
# Attachment 3 – Alternative Scoring Sheet





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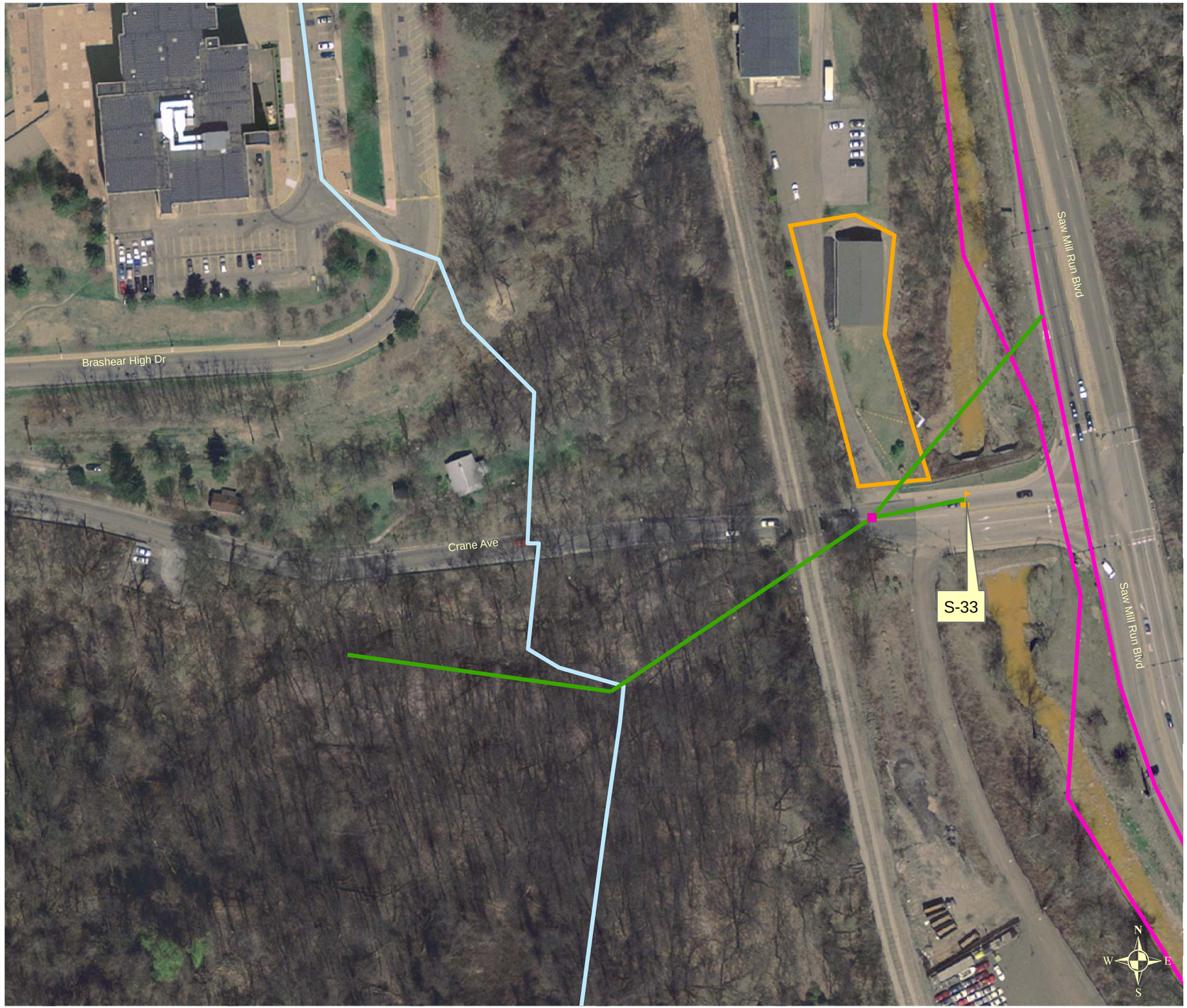
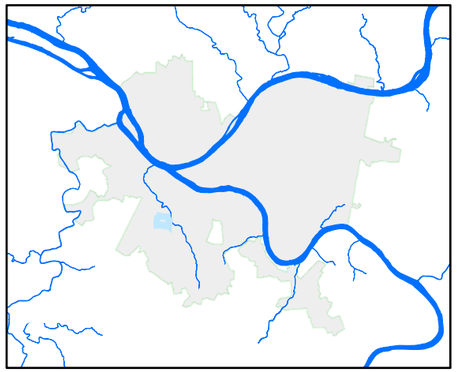


Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# S-33
# Facilities Boundary Map
# Sawmillrun Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0214.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 3 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 4 | 4 | 4 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.716** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.648** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.648** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.568** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.632** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.600** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.584** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.584** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.699** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.359** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

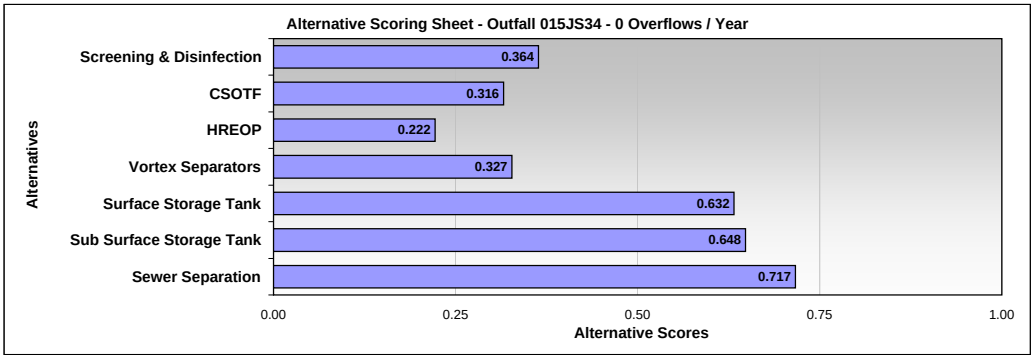
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.433** |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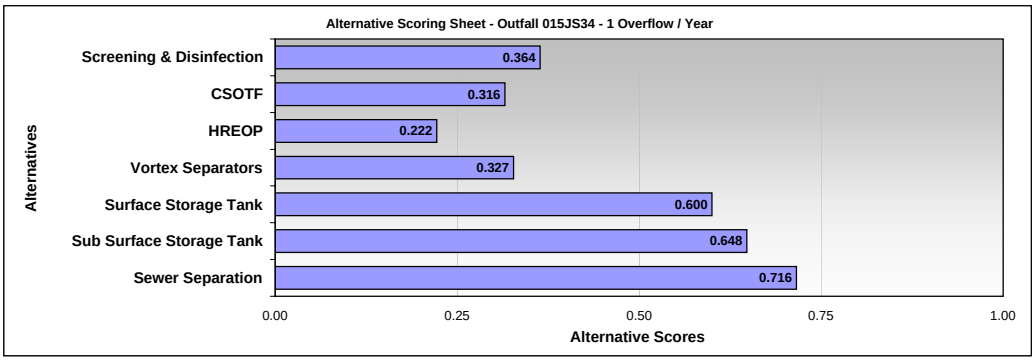
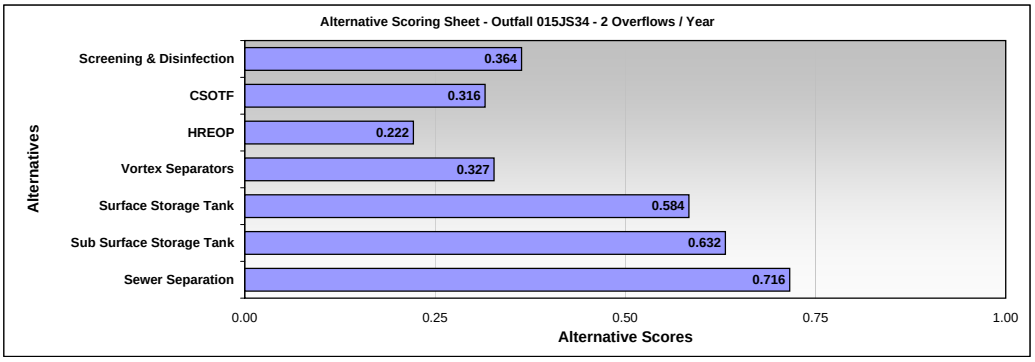
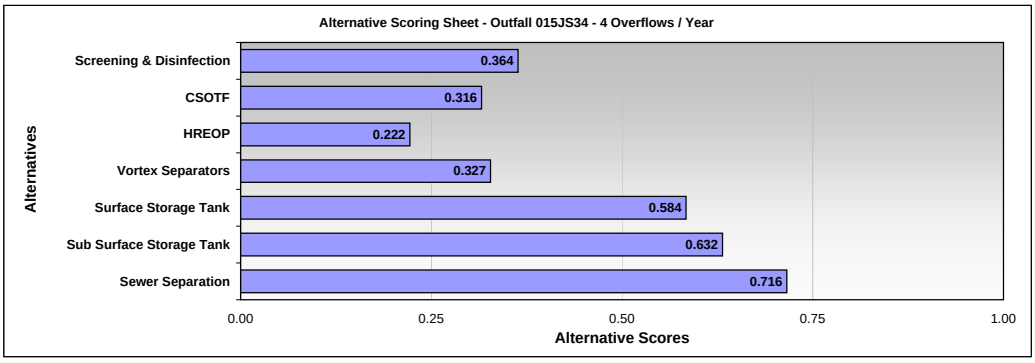
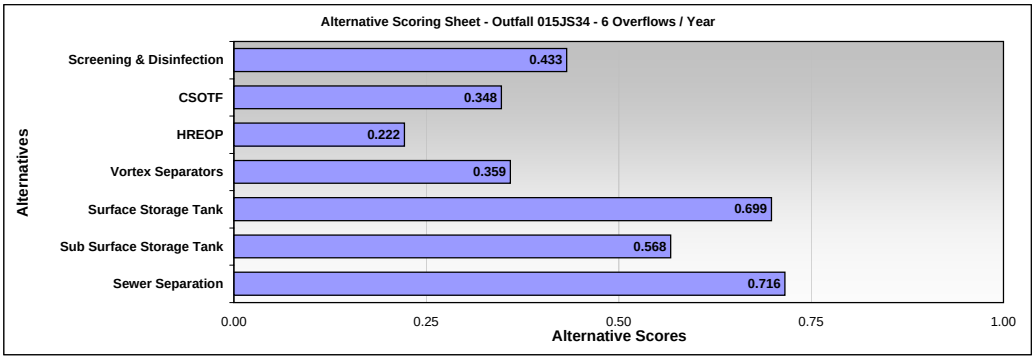
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.632
0.648
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS34 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.600
0.648
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS34 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.584
0.632
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS34 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.584
0.632
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015JS34 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.433
0.348
0.222
0.359
0.699
0.568
0.716
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 8 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,200,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,485 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **7,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,246,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.09 | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.11 | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 38 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 26 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.11 | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **71,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 8.83 | 13.66 | = Peak Rate |
| Force Main Diameter (In) | | 20 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,690,000** | **$ 28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 13.66 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 21,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 110 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **16,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 8.83 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,770,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.09 | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.11 | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 38 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 26 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.11 | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,201,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.09 | 0.14 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 2 | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.6 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **364,000** | **$ 13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 13.66 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 21,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,050 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **95,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 8.83 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 21,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,638,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.83 | | 13.66 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 1 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,143,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 9.71 | | 15.03 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 21 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,780,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.66 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 8.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 9.71 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 50 | | 24 | |
| Passes / Detention (Min) | | 3 | | 15.97 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **540,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 9,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,815,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 0 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.83 | 13.66 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 56 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 28 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.14 | 18,816 | |
| **Construction Cost (CSOTF)** | **$** | **16,384,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.83 | 13.66 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 20 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,690,000** | **$ 28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 13.66 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 28,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **119,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 8.83 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 8.83 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | 23 | |
| Passes / Detention (Min) | | 3 | **15.82** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **522,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 9,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **20,684,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.83 | | 13.66 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 110 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 16 | | **OK** | Input by Engineer |
| Width (Ft) | | 8 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,587,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 9.71 | | 15.03 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 21 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,780,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.66 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 8.83 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 9.71 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 50 | | 24 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.97** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 540,000 | $ | 416,000 | |
| **Construction Cost (Disinfection)** | **$** | **956,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 26,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,348,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 12,439 | CF |
| | 0.09 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 13.66 | CFS |
| | 8.83 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 8.83 | | 13.66 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **821,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 8.83 | | 13.66 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 20 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,690,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 13.66 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 140 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **20,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 8.83 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | | 23 | |
| Passes / Detention (Min) | | 3 | | **15.82** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 522,000 | $ | 392,000 | |
| **Construction Cost (Disinfection)** | **$** | **914,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,621,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 8 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,200,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,485 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **7,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **1,246,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.03 | | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.03 | | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 23 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 16 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.04 | | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **18,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 3.18 | | 4.93 | = Peak Rate |
| Force Main Diameter (In) | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,916,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.93 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 8,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 40 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **7,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 3.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **560,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,664,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.03 | | 4,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.03 | | 5,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 23 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 16 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.04 | | 5,520 | **Sufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **995,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.03 | | 0.04 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 7.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **307,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.93 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 8,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **45,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **560,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,061,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.18 | | 4.93 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.50 | | 5.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,969,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.93 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **560,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.50 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | |
| Passes | | 3 | | **16.61** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **412,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,331,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.18 | 4.93 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.18 | 4.93 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,916,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.93 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.18 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **560,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.18 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | 14 | |
| Passes | | 3 | **16.49** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **405,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **19,470,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.18 | | 4.93 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,699,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.50 | | 5.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,969,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.93 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.18 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **560,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.50 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | Input by Engineer |
| Passes | | 3 | | **16.61** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 412,000 | $ | 255,000 | |
| **Construction Cost (Disinfection)** | **$** | **667,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **5,074,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 3,509 | CF |
| | 0.03 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 4.93 | CFS |
| | 3.18 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.18 | | 4.93 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **560,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.18 | | 4.93 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,916,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.93 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.18 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **16.49** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 405,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **651,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,305,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 8 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,200,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,485 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **7,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,246,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.02 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **11,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.40 | | 3.71 | = Peak Rate |
| Force Main Diameter (In) | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,781,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.71 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 20 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **4,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.40 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **523,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,479,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.02 | | 2,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.02 | | 2,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 15 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 10 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.02 | | 2,250 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **967,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.02 | | 0.03 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **299,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.71 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 3,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **21,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.40 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **523,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,962,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.40 | | 3.71 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.64 | | 4.08 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,823,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.71 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.40 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **523,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.64 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | |
| Passes | | 3 | | **16.55** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **393,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,125,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.40 | | 3.71 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.40 | | 3.71 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,781,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.71 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.40 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **523,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.40 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | |
| Passes | | 3 | | **16.16** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **388,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **19,266,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.40 | | 3.71 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,576,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.64 | | 4.08 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,823,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.71 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.40 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **523,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.64 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 26 | | 13 | Input by Engineer |
| Passes | | 3 | | **16.55** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 393,000 | $ | 227,000 | |
| **Construction Cost (Disinfection)** | **$** | **620,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,719,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 2,311 | CF |
| | 0.02 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 3.71 | CFS |
| | 2.40 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.40 | | 3.71 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **523,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.40 | | 3.71 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,781,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.71 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.40 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | |
| Passes | | 3 | | **16.16** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 388,000 | $ | 218,000 | |
| **Construction Cost (Disinfection)** | **$** | **606,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,085,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 8 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **1,200,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,485 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **7,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 1,246,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 1,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.01 | | 1,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 11 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 8 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.01 | | 1,320 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **5,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 0.77 | | 1.19 | = Peak Rate |
| Force Main Diameter (In) | 6 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **939,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.19 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 2,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 10 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **2,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 0.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **448,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,550,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.01 | | 1,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.01 | | 1,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 11 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 8 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.01 | | 1,320 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **941,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.01 | | 0.01 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 2.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **292,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 1.19 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 2,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **15,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 0.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **448,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,848,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.77 | | 1.19 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.85 | | 1.31 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 6 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,005,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.19 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **448,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.85 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 15 | | 8 | |
| Passes | | 3 | | **18.30** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **355,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 1,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **2,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **2,188,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.77 | | 1.19 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 200 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 21 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 11 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.02 | | 2,772 | |
| **Construction Cost (CSOTF)** | **$** | **16,398,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.77 | | 1.19 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 6 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **939,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.19 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **448,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.77 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 15 | | 7 | |
| Passes | | 3 | | **17.62** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **354,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 5,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **18,293,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.77 | | 1.19 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 10 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 5 | | **OK** | Input by Engineer |
| Width (Ft) | | 3 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,322,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.85 | | 1.31 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 6 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,005,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.19 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 0.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **448,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 0.85 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 15 | | 8 | Input by Engineer |
| Passes | | 3 | | **18.30** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 355,000 | $ | 159,000 | |
| **Construction Cost (Disinfection)** | **$** | **514,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,451,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 1,189 | CF |
| | 0.01 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 1.19 | CFS |
| | 0.77 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 0.77 | | 1.19 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **448,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 0.77 | | 1.19 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 6 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **939,000** | **$** | **16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 1.19 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 200 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 10 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **2,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 0.77 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 15 | | 7 | |
| Passes | | 3 | | **17.62** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 354,000 | $ | 156,000 | |
| **Construction Cost (Disinfection)** | **$** | **510,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 22,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,061,000** | | | |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 8 | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **1,200,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 3,485 | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **7,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **1,246,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.00 | | - | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.00 | | 0 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 1 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 1 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.00 | | 15 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **0** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 0.13 | | 0.21 | = Peak Rate |
| Force Main Diameter (In) | 3 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 4.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **398,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 0.21 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 0 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 0 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **-** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 0.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **418,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **970,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.00 | | - | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.00 | | 0 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 1 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 1 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.00 | | 15 | **Insufficient Volume** |
| Tank Area (SF) | 0 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **916,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.00 | | 0.00 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 0 | | | Input by Engineer |
| Force Main Velocity (FPS) | 0.0 | | **Check:** | **No Main Req'd** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **285,000** | **$** | **11,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 0.21 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 0 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **-** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 0.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **418,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 19,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **38,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **1,770,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.13 | | 0.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.15 | | 0.23 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 3 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 4.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **409,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 0.21 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **418,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.15 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 7 | | 3 | |
| Passes | | 3 | | **18.50** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **340,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 0 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **-** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **1,543,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.13 | 0.21 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 15 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 8 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.01 | 1,440 | |
| **Construction Cost (CSOTF)** | **$** | **16,399,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.13 | 0.21 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 3 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 4.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **398,000** | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 0.21 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 0.13 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **418,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 0.13 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 7 | 3 | |
| Passes | | 3 | **20.35** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **340,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 5,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **17,696,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 0.13 | | 0.21 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 10 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 5 | | **OK** | Input by Engineer |
| Width (Ft) | | 3 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,222,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.15 | | 0.23 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 4.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **409,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 0.21 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 0.13 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **418,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 0.15 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 7 | | 3 | Input by Engineer |
| Passes | | 3 | | **18.50** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 340,000 | $ | 114,000 | |
| **Construction Cost (Disinfection)** | **$** | **454,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 22,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **2,663,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 7 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 76 | CF |
| | 0.00 | MG |
| Total Volume | 22,258 | CF |
| | 0.17 | MG |
| Peak Rate | 0.21 | CFS |
| | 0.13 | MGD |

| Capital Costs - 015JS34 / Sewershed ACSO 015JS34 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 0.13 | | 0.21 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **418,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 0.13 | | 0.21 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 3 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 4.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **398,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 0.21 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 0.13 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 7 | | 3 | |
| Passes | | 3 | | **20.35** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 340,000 | $ | 114,000 | |
| **Construction Cost (Disinfection)** | **$** | **454,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 22,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **1,430,000** | | | |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 8.83 | $80,561 | 20 | 10.910 | $878,915 |
| | Tank O&M | No. Events / Yr | 7 | $4,478 | 50 | 14.484 | $64,862 |
| | | Const Cost ($) | $71,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 9 | $8,182 | 20 | 10.910 | $89,263 |
| | Odor Control O&M | Capacity (cfm) | 110 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,252 |
| | | | **Total Annual O&M** | **$94,000** | | **Total PW O&M** | **$1,050,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.09 | $3,847 | 20 | 10.910 | $41,966 |
| | Tank O&M | No. Events / Yr | 7 | $7,303 | 50 | 14.484 | $105,778 |
| | | Const Cost ($) | $1,201,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 9 | $8,182 | 20 | 10.910 | $89,263 |
| | Odor Control O&M | Capacity (cfm) | 1,050 | $3,675 | 20 | 10.910 | $40,094 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,977 |
| | | | **Total Annual O&M** | **$24,000** | | **Total PW O&M** | **$281,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 8.83 | $80,561 | 20 | 10.910 | $878,915 |
| | Sed. Basin O&M | Flow Rate (mgd) | 8.83 | $994 | 50 | 14.484 | $14,390 |
| | Screening O&M | Flow Rate (mgd) | 8.83 | $8,182 | 20 | 10.910 | $89,263 |
| | Disinfection O&M | Flow Rate (mgd) | 8.83 | $60,618 | 20 | 10.910 | $661,338 |
| | Odor Control O&M | Capacity (cfm) | 1,400.00 | $4,900 | 20 | 10.910 | $53,459 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,952 |
| | | | **Total Annual O&M** | **$156,000** | | **Total PW O&M** | **$1,712,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 9.71 | $85,858 | 20 | 10.910 | $936,702 |
| | HREP O&M | Flow Rate (mgd) | 8.83 | $83,861 | 20 | 10.910 | $914,921 |
| | Screening O&M | Flow Rate (mgd) | 8.83 | $8,182 | 20 | 10.910 | $89,263 |
| | Disinfection O&M | Flow Rate (mgd) | 9.71 | $64,242 | 20 | 10.910 | $700,874 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,138 |
| | | | **Total Annual O&M** | **$243,000** | | **Total PW O&M** | **$2,670,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 9.71 | $85,858 | 20 | 10.910 | $936,702 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 8.83 | $994 | 20 | 10.910 | $10,839 |
| | Screening O&M | Flow Rate (mgd) | 8.83 | $8,182 | 20 | 10.910 | $89,263 |
| | Disinfection O&M | Flow Rate (mgd) | 9.71 | $64,242 | 20 | 10.910 | $700,874 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,931 |
| | | | **Total Annual O&M** | **$165,000** | | **Total PW O&M** | **$1,810,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 8.83 | $80,561 | 20 | 10.910 | $878,915 |
| | Screening O&M | Flow Rate (mgd) | 8.83 | $8,182 | 20 | 10.910 | $89,263 |
| | Disinfection O&M | Flow Rate (mgd) | 8.83 | $60,618 | 20 | 10.910 | $661,338 |
| | Odor Control O&M | Capacity (cfm) | 140.00 | $490 | 20 | 10.910 | $5,346 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,683 |
| | | | **Total Annual O&M** | **$150,000** | | **Total PW O&M** | **$1,650,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.18 | $40,742 | 20 | 10.910 | $444,495 |
| | Tank O&M | No. Events / Yr | 7 | $4,346 | 50 | 14.484 | $62,943 |
| | | Const Cost ($) | $18,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,701 | 20 | 10.910 | $84,020 |
| | Odor Control O&M | Capacity (cfm) | 40 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,360 |
| | | | **Total Annual O&M** | **$53,000** | | **Total PW O&M** | **$602,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.03 | $1,651 | 20 | 10.910 | $18,018 |
| | Tank O&M | No. Events / Yr | 7 | $6,788 | 50 | 14.484 | $98,319 |
| | | Const Cost ($) | $995,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,701 | 20 | 10.910 | $84,020 |
| | Odor Control O&M | Capacity (cfm) | 400 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,898 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$219,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.18 | $40,742 | 20 | 10.910 | $444,495 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.18 | $358 | 50 | 14.484 | $5,187 |
| | Screening O&M | Flow Rate (mgd) | 3.18 | $7,701 | 20 | 10.910 | $84,020 |
| | Disinfection O&M | Flow Rate (mgd) | 3.18 | $32,555 | 20 | 10.910 | $355,178 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,608 |
| | | | **Total Annual O&M** | **$84,000** | | **Total PW O&M** | **$922,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.50 | $43,421 | 20 | 10.910 | $473,720 |
| | HREP O&M | Flow Rate (mgd) | 3.18 | $46,019 | 20 | 10.910 | $502,062 |
| | Screening O&M | Flow Rate (mgd) | 3.18 | $7,701 | 20 | 10.910 | $84,020 |
| | Disinfection O&M | Flow Rate (mgd) | 3.50 | $34,502 | 20 | 10.910 | $376,412 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,323 |
| | | | **Total Annual O&M** | **$132,000** | | **Total PW O&M** | **$1,453,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.50 | $43,421 | 20 | 10.910 | $473,720 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.18 | $358 | 20 | 10.910 | $3,907 |
| | Screening O&M | Flow Rate (mgd) | 3.18 | $7,701 | 20 | 10.910 | $84,020 |
| | Disinfection O&M | Flow Rate (mgd) | 3.50 | $34,502 | 20 | 10.910 | $376,412 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,677 |
| | | | **Total Annual O&M** | **$86,000** | | **Total PW O&M** | **$949,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.18 | $40,742 | 20 | 10.910 | $444,495 |
| | Screening O&M | Flow Rate (mgd) | 3.18 | $7,701 | 20 | 10.910 | $84,020 |
| | Disinfection O&M | Flow Rate (mgd) | 3.18 | $32,555 | 20 | 10.910 | $355,178 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,467 |
| | | | **Total Annual O&M** | **$82,000** | | **Total PW O&M** | **$896,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.40 | $33,736 | 20 | 10.910 | $368,059 |
| | Tank O&M | No. Events / Yr | 7 | $4,328 | 50 | 14.484 | $62,689 |
| | | Const Cost ($) | $11,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,635 | 20 | 10.910 | $83,303 |
| | Odor Control O&M | Capacity (cfm) | 20 | $70 | 20 | 10.910 | $764 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,700 |
| | | | **Total Annual O&M** | **$46,000** | | **Total PW O&M** | **$524,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.02 | $1,249 | 20 | 10.910 | $13,630 |
| | Tank O&M | No. Events / Yr | 7 | $6,718 | 50 | 14.484 | $97,305 |
| | | Const Cost ($) | $967,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,635 | 20 | 10.910 | $83,303 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,700 |
| | | | **Total Annual O&M** | **$17,000** | | **Total PW O&M** | **$203,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.40 | $33,736 | 20 | 10.910 | $368,059 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.40 | $270 | 50 | 14.484 | $3,910 |
| | Screening O&M | Flow Rate (mgd) | 2.40 | $7,635 | 20 | 10.910 | $83,303 |
| | Disinfection O&M | Flow Rate (mgd) | 2.40 | $27,409 | 20 | 10.910 | $299,035 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,867 |
| | | | **Total Annual O&M** | **$71,000** | | **Total PW O&M** | **$779,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.64 | $35,954 | 20 | 10.910 | $392,258 |
| | HREP O&M | Flow Rate (mgd) | 2.40 | $38,976 | 20 | 10.910 | $425,227 |
| | Screening O&M | Flow Rate (mgd) | 2.40 | $7,635 | 20 | 10.910 | $83,303 |
| | Disinfection O&M | Flow Rate (mgd) | 2.64 | $29,048 | 20 | 10.910 | $316,912 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,241 |
| | | | **Total Annual O&M** | **$112,000** | | **Total PW O&M** | **$1,234,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.64 | $35,954 | 20 | 10.910 | $392,258 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.40 | $270 | 20 | 10.910 | $2,946 |
| | Screening O&M | Flow Rate (mgd) | 2.40 | $7,635 | 20 | 10.910 | $83,303 |
| | Disinfection O&M | Flow Rate (mgd) | 2.64 | $29,048 | 20 | 10.910 | $316,912 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,929 |
| | | | **Total Annual O&M** | **$73,000** | | **Total PW O&M** | **$805,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.40 | $33,736 | 20 | 10.910 | $368,059 |
| | Screening O&M | Flow Rate (mgd) | 2.40 | $7,635 | 20 | 10.910 | $83,303 |
| | Disinfection O&M | Flow Rate (mgd) | 2.40 | $27,409 | 20 | 10.910 | $299,035 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,763 |
| | | | **Total Annual O&M** | **$69,000** | | **Total PW O&M** | **$762,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.77 | $15,790 | 20 | 10.910 | $172,264 |
| | Tank O&M | No. Events / Yr | 7 | $4,313 | 50 | 14.484 | $62,472 |
| | | Const Cost ($) | $5,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,499 | 20 | 10.910 | $81,819 |
| | Odor Control O&M | Capacity (cfm) | 10 | $35 | 20 | 10.910 | $382 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,055 |
| | | | **Total Annual O&M** | **$28,000** | | **Total PW O&M** | **$322,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.01 | $801 | 20 | 10.910 | $8,742 |
| | Tank O&M | No. Events / Yr | 7 | $6,653 | 50 | 14.484 | $96,364 |
| | | Const Cost ($) | $941,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 1 | $7,499 | 20 | 10.910 | $81,819 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,451 |
| | | | **Total Annual O&M** | **$16,000** | | **Total PW O&M** | **$193,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 0.77 | $15,790 | 20 | 10.910 | $172,264 |
| | Sed. Basin O&M | Flow Rate (mgd) | 0.77 | $87 | 50 | 14.484 | $1,255 |
| | Screening O&M | Flow Rate (mgd) | 0.77 | $7,499 | 20 | 10.910 | $81,819 |
| | Disinfection O&M | Flow Rate (mgd) | 0.77 | $13,717 | 20 | 10.910 | $149,647 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,083 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$419,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 0.85 | $16,828 | 20 | 10.910 | $183,590 |
| | HREP O&M | Flow Rate (mgd) | 0.77 | $19,978 | 20 | 10.910 | $217,961 |
| | Screening O&M | Flow Rate (mgd) | 0.77 | $7,499 | 20 | 10.910 | $81,819 |
| | Disinfection O&M | Flow Rate (mgd) | 0.85 | $14,537 | 20 | 10.910 | $158,593 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,880 |
| | | | **Total Annual O&M** | **$59,000** | | **Total PW O&M** | **$652,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 0.85 | $16,828 | 20 | 10.910 | $183,590 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 0.77 | $87 | 20 | 10.910 | $945 |
| | Screening O&M | Flow Rate (mgd) | 0.77 | $7,499 | 20 | 10.910 | $81,819 |
| | Disinfection O&M | Flow Rate (mgd) | 0.85 | $14,537 | 20 | 10.910 | $158,593 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,285 |
| | | | **Total Annual O&M** | **$39,000** | | **Total PW O&M** | **$431,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 0.77 | $15,790 | 20 | 10.910 | $172,264 |
| | Screening O&M | Flow Rate (mgd) | 0.77 | $7,499 | 20 | 10.910 | $81,819 |
| | Disinfection O&M | Flow Rate (mgd) | 0.77 | $13,717 | 20 | 10.910 | $149,647 |
| | Odor Control O&M | Capacity (cfm) | 10.00 | $35 | 20 | 10.910 | $382 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,018 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$410,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.13 | $4,893 | 20 | 10.910 | $53,377 |
| | Tank O&M | No. Events / Yr | 7 | $4,301 | 50 | 14.484 | $62,291 |
| | | Const Cost ($) | $0 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 0 | $7,447 | 20 | 10.910 | $81,242 |
| | Odor Control O&M | Capacity (cfm) | 0 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,761 |
| | | | **Total Annual O&M** | **$17,000** | | **Total PW O&M** | **$200,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.00 | $128 | 20 | 10.910 | $1,397 |
| | Tank O&M | No. Events / Yr | 7 | $6,591 | 50 | 14.484 | $95,458 |
| | | Const Cost ($) | $916,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 0 | $7,447 | 20 | 10.910 | $81,242 |
| | Odor Control O&M | Capacity (cfm) | 0 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,300 |
| | | | **Total Annual O&M** | **$15,000** | | **Total PW O&M** | **$180,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 0.13 | $4,893 | 20 | 10.910 | $53,377 |
| | Sed. Basin O&M | Flow Rate (mgd) | 0.13 | $15 | 50 | 14.484 | $217 |
| | Screening O&M | Flow Rate (mgd) | 0.13 | $7,447 | 20 | 10.910 | $81,242 |
| | Disinfection O&M | Flow Rate (mgd) | 0.13 | $4,713 | 20 | 10.910 | $51,415 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,726 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$194,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 0.15 | $5,214 | 20 | 10.910 | $56,886 |
| | HREP O&M | Flow Rate (mgd) | 0.13 | $7,123 | 20 | 10.910 | $77,709 |
| | Screening O&M | Flow Rate (mgd) | 0.13 | $7,447 | 20 | 10.910 | $81,242 |
| | Disinfection O&M | Flow Rate (mgd) | 0.15 | $4,994 | 20 | 10.910 | $54,488 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $7,054 |
| | | | **Total Annual O&M** | **$25,000** | | **Total PW O&M** | **$277,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 0.15 | $5,214 | 20 | 10.910 | $56,886 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 0.13 | $15 | 20 | 10.910 | $164 |
| | Screening O&M | Flow Rate (mgd) | 0.13 | $7,447 | 20 | 10.910 | $81,242 |
| | Disinfection O&M | Flow Rate (mgd) | 0.15 | $4,994 | 20 | 10.910 | $54,488 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,730 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$197,000** |

| ACSO 015JS34 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 0.13 | $4,893 | 20 | 10.910 | $53,377 |
| | Screening O&M | Flow Rate (mgd) | 0.13 | $7,447 | 20 | 10.910 | $81,242 |
| | Disinfection O&M | Flow Rate (mgd) | 0.13 | $4,713 | 20 | 10.910 | $51,415 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,686 |
| | | | **Total Annual O&M** | **$18,000** | | **Total PW O&M** | **$190,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $1.2 | $1,246,000 | $0 |
| 1 | $1.2 | $1,246,000 | $0 |
| 2 | $1.2 | $1,246,000 | $0 |
| 4 | $1.2 | $1,246,000 | $0 |
| 6 | $1.2 | $1,246,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $2.9 | $2,638,000 | $281,000 |
| 1 | $2.3 | $2,061,000 | $219,000 |
| 2 | $2.2 | $1,962,000 | $203,000 |
| 4 | $2.0 | $1,848,000 | $193,000 |
| 6 | $2.0 | $1,770,000 | $180,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.8 | $3,770,000 | $1,050,000 |
| 1 | $3.3 | $2,664,000 | $602,000 |
| 2 | $3.0 | $2,479,000 | $524,000 |
| 4 | $1.9 | $1,550,000 | $322,000 |
| 6 | $1.2 | $970,000 | $200,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.6 | $5,815,000 | $1,810,000 |
| 1 | $4.3 | $3,331,000 | $949,000 |
| 2 | $3.9 | $3,125,000 | $805,000 |
| 4 | $2.6 | $2,188,000 | $431,000 |
| 6 | $1.7 | $1,543,000 | $197,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $10.0 | $7,348,000 | $2,670,000 |
| 1 | $6.5 | $5,074,000 | $1,453,000 |
| 2 | $6.0 | $4,719,000 | $1,234,000 |
| 4 | $4.1 | $3,451,000 | $652,000 |
| 6 | $2.9 | $2,663,000 | $277,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $22.4 | $20,684,000 | $1,712,000 |
| 1 | $20.4 | $19,470,000 | $922,000 |
| 2 | $20.0 | $19,266,000 | $779,000 |
| 4 | $18.7 | $18,293,000 | $419,000 |
| 6 | $17.9 | $17,696,000 | $194,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.3 | $4,621,000 | $1,650,000 |
| 1 | $4.2 | $3,305,000 | $896,000 |
| 2 | $3.8 | $3,085,000 | $762,000 |
| 4 | $2.5 | $2,061,000 | $410,000 |
| 6 | $1.6 | $1,430,000 | $190,000 |

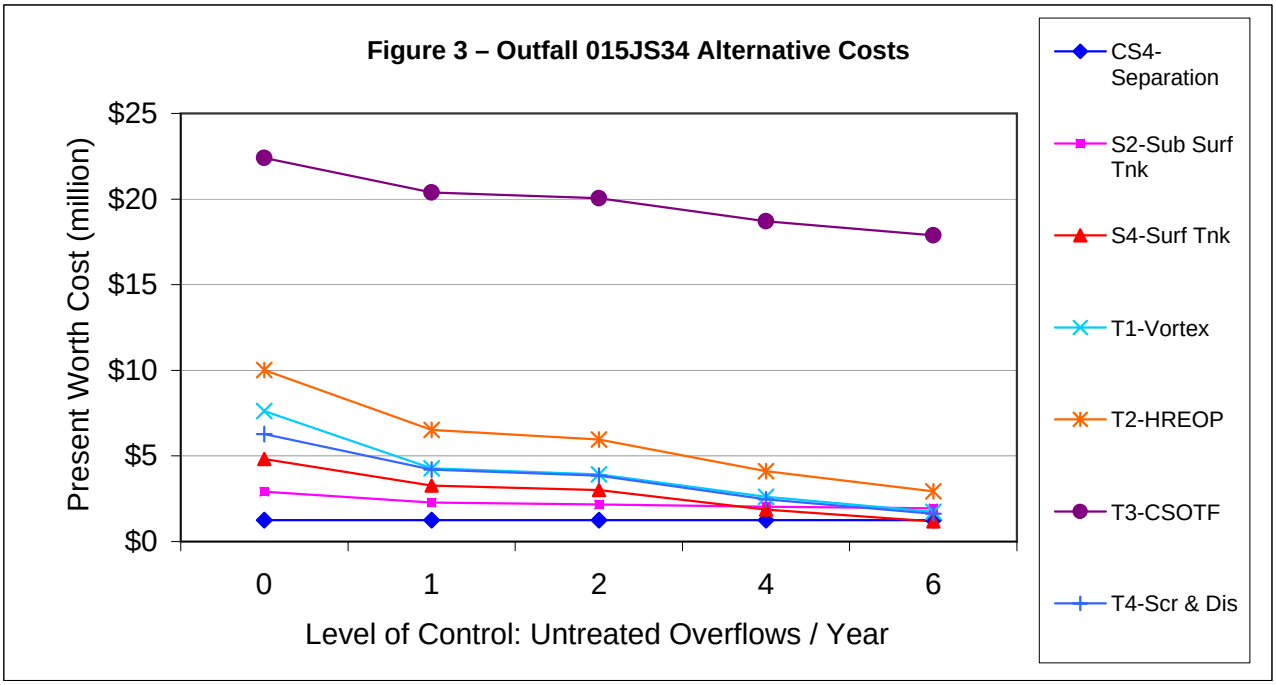


Figure 3 – Outfall 015JS34 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015JS34 |
| **Location Name** | S-34 |
| **Model ID** | ADC 015JS34.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015JS34 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 7 | |
| Peak Volume: | 12,439 | $ft^3$ |
| | 0.09 | MG |
| Total Volume: | 22,258 | $ft^3$ |
| | 0.17 | MG |
| Peak Rate: | 13.66 | cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:15 | 50 | 8/20/2005 18:30 | 12439.12 | 93.051 | 0 | 13.66 | 0 |
| 7/5/2005 16:30 | 34 | 7/5/2005 17:00 | 3508.93 | 26.249 | 1 | 3.71 | 2 |
| 8/29/2005 13:30 | 20 | 8/29/2005 13:45 | 2310.73 | 17.285 | 2 | 4.93 | 1 |
| 7/26/2005 19:50 | 30 | 7/26/2005 20:15 | 1619.42 | 12.114 | 3 | 1.91 | 3 |
| 7/15/2005 17:45 | 34 | 7/15/2005 18:15 | 1188.74 | 8.892 | 4 | 0.94 | 5 |
| 5/13/2005 22:30 | 93 | 5/13/2005 22:45 | 1115.20 | 8.342 | 5 | 1.19 | 4 |
| 9/29/2005 5:37 | 12 | 9/29/2005 5:45 | 76.35 | 0.571 | 6 | 0.21 | 6 |

## Region 1

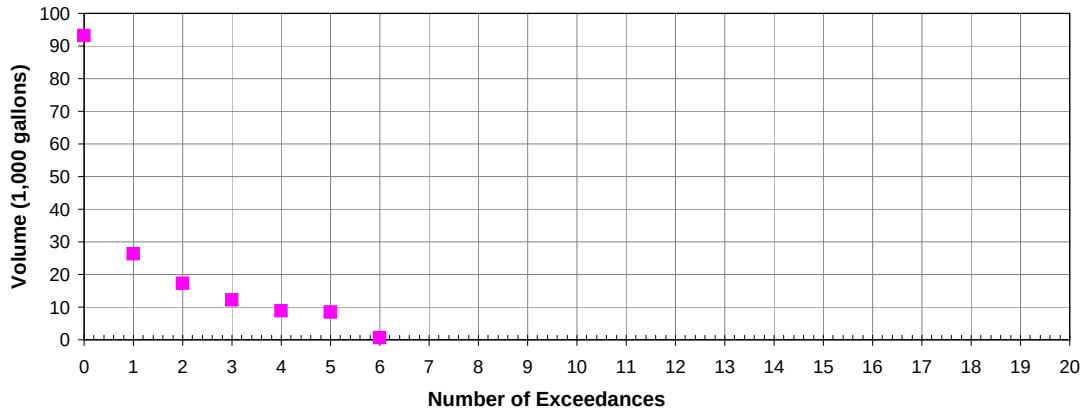
### PWSA CSO DISCHARGES
### for "Typical Year - 2005"
### Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015JS34 |
| **Location Name** | S-34 |
| **Model ID** | ADC 015JS34.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015JS34 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

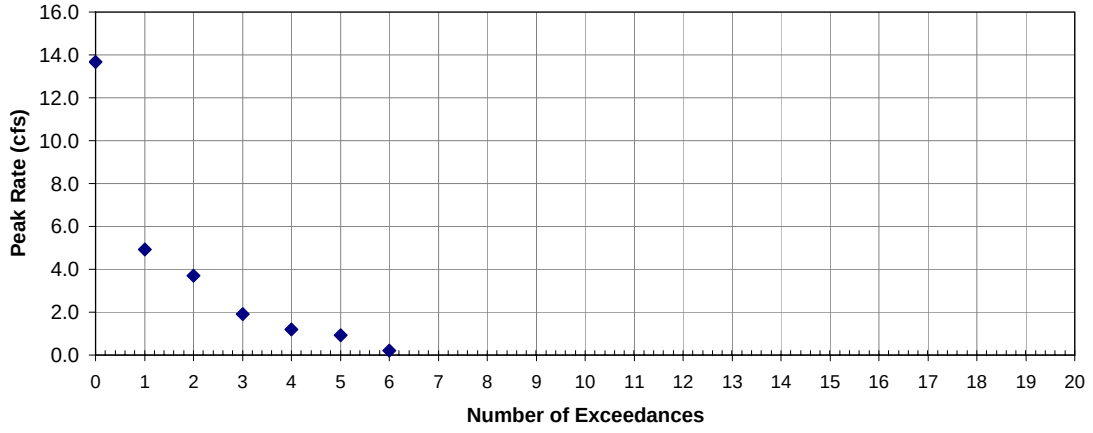
**Results Summary**

| | | |
|---|---|---|
| Number of Events: | 7 | |
| Peak Volume: | 12,439 | $ft^3$ |
| | 0.09 | MG |
| Total Volume: | 22,258 | $ft^3$ |
| | 0.17 | MG |
| Peak Rate: | 13.66 | cfs |

### Figure 1 - Outfall 015JS34 CSO Volume




### Figure 2 - Outfall 015JS34 CSO Peak Flow Rate



## D.26.6 S-34 – SAW MILL RUN INTERCEPTOR SEWERSHED – NPDES# 015JS34

### Description of Outfall

Outfall 015JS34 conveys overflows from the ALCOSAN diversion chamber S-34 to Saw Mill Run. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run adjacent to Saw Mill Run Boulevard near Crane Avenue in the City of Pittsburgh. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The Saw Mill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 015JS34 typically experiences 5 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015JS34 is approximately 0.09 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015JS34 is approximately 13.66 CFS. *Figure 1 – Outfall 015JS34 CSO Volume* and *Figure 2 – Outfall 015JS34 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 7 largest CSO events during the typical year baseline conditions simulation.

DRAFT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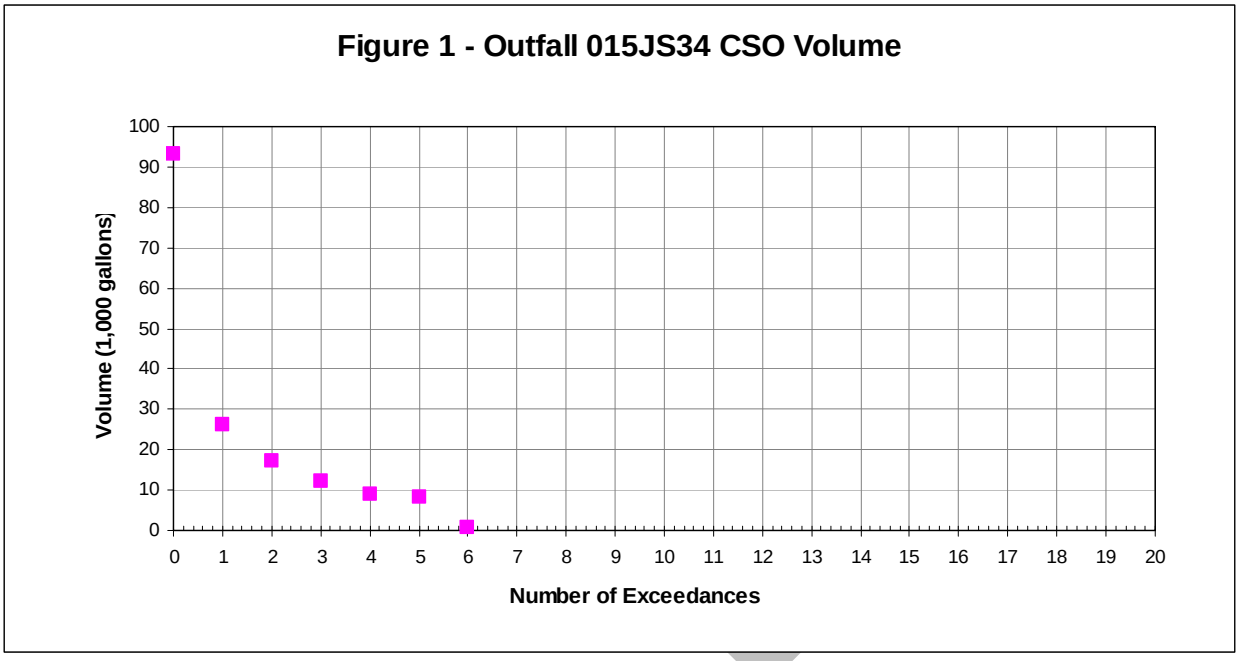


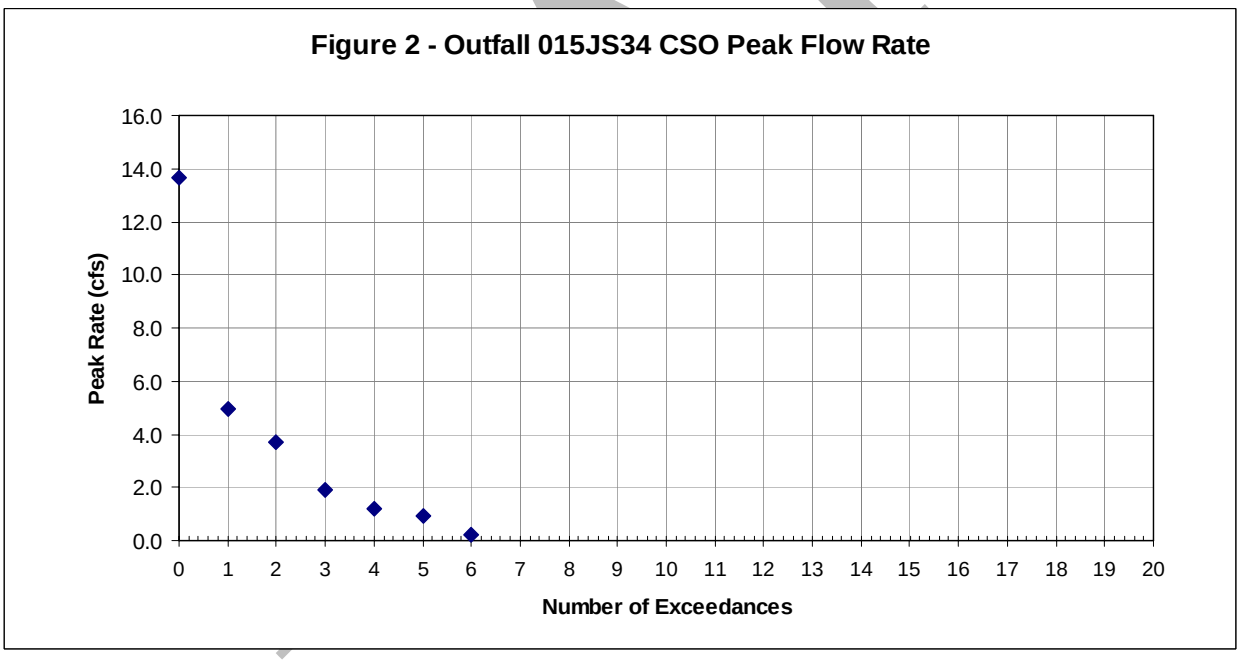


There appears to be undeveloped space available for potential storage or treatment facilities in the vicinity of outfall 015JS34, however this area is steep. The site is generally bounded by Saw Mill Run to the west, and Saw Mill Run Boulevard to the east. The diversion chamber for this

outfall is located to the east of Saw Mill Run Boulevard adjacent to a steep hillside. The steepness of the hillside may limit construction of a potential storage or treatment facility.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015JS34. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-015JS34: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-015JS34: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015JS34: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes.

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Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-015JS34: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015JS34: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015JS34: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-015JS34: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

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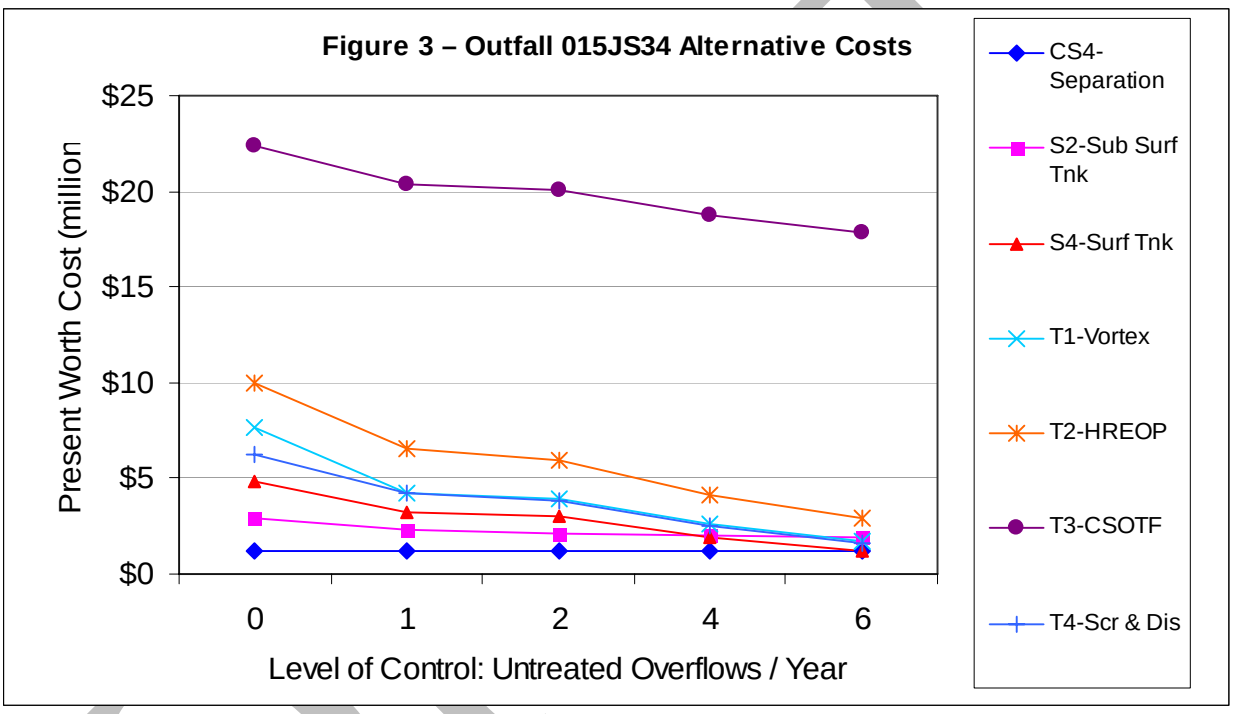
The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 015JS34 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative CS4-015JS34: Sewer Separation be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

It appears that the site may be very limited for the construction of a storage or treatment facility due to the steep slopes in the vicinity of the outfall and the diversion structure.

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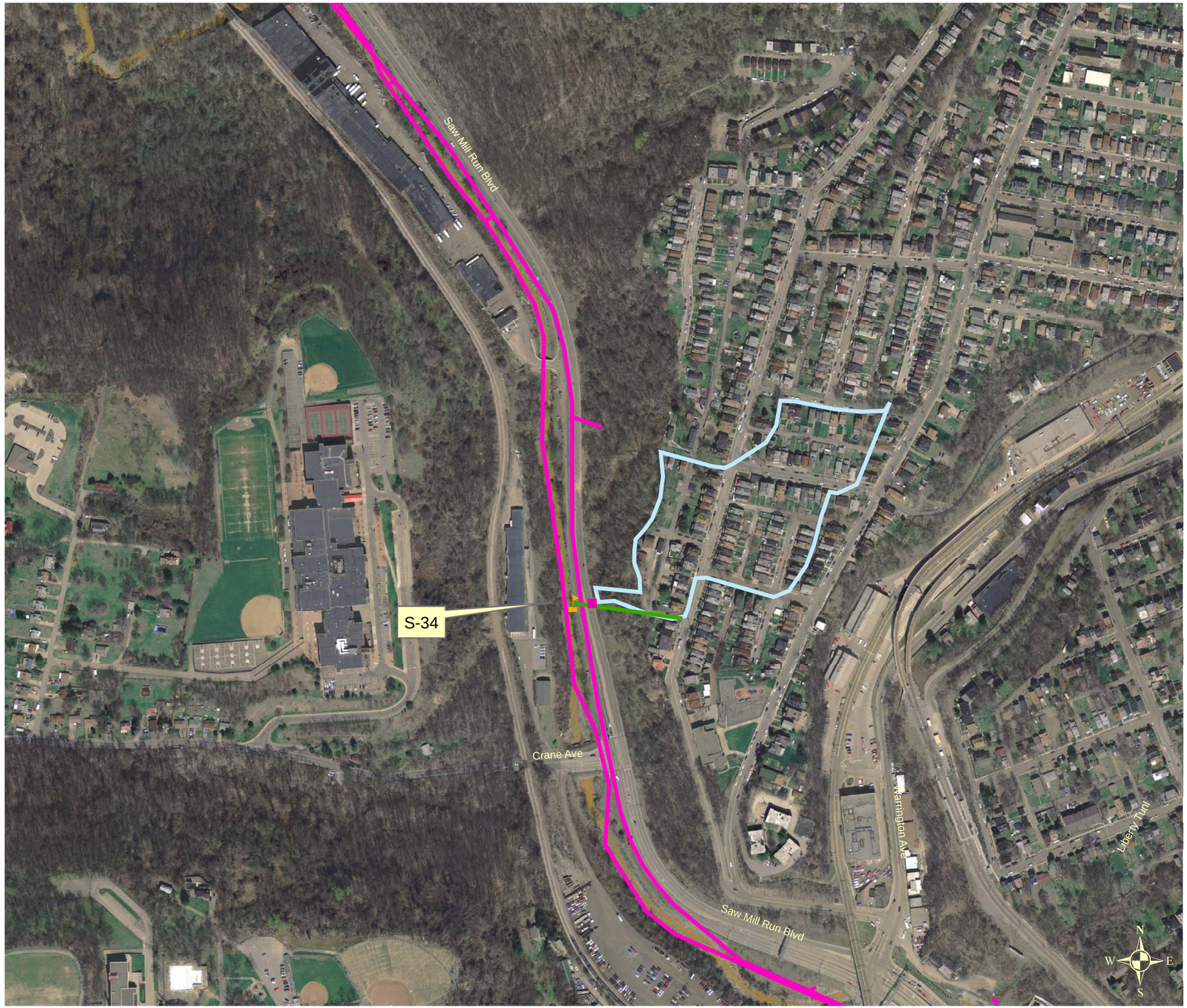


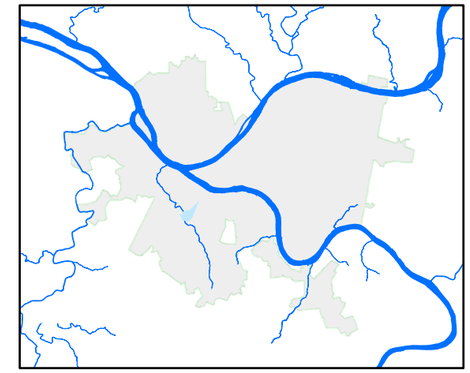

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

0 340 680 Feet

# Attachment 1
# S-34
# Tributary Area Map
# Saw Mill Run Interceptor Sewershed

CSO Controls Alternatives

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# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 235 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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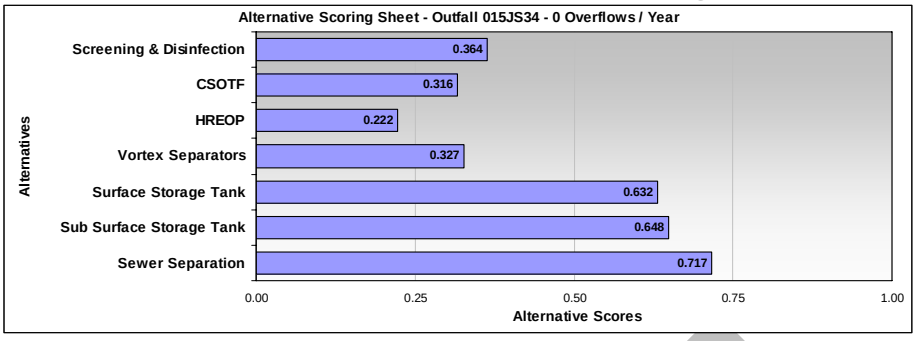
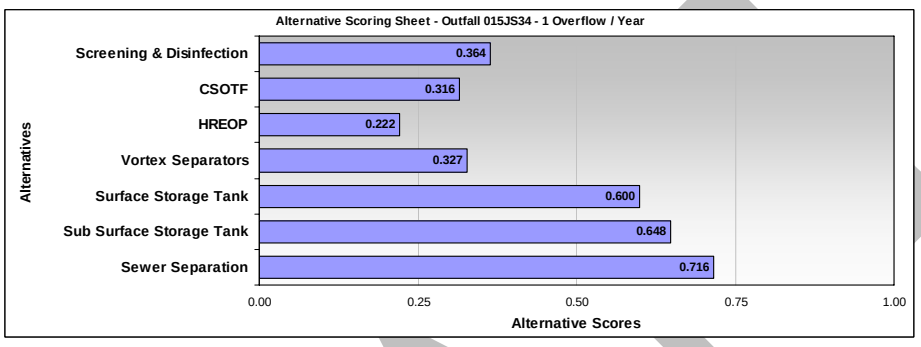
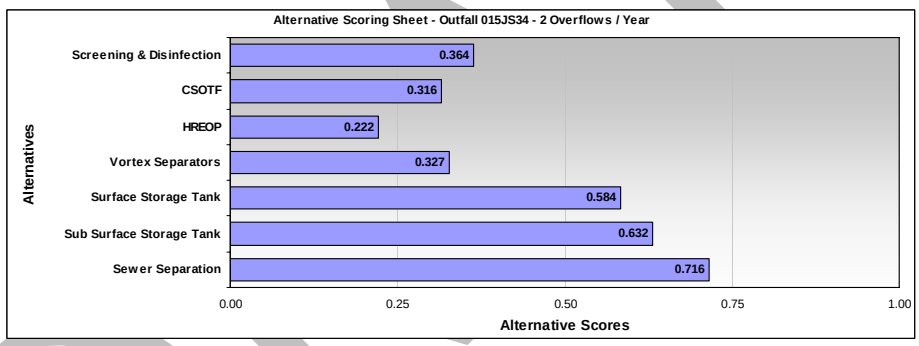
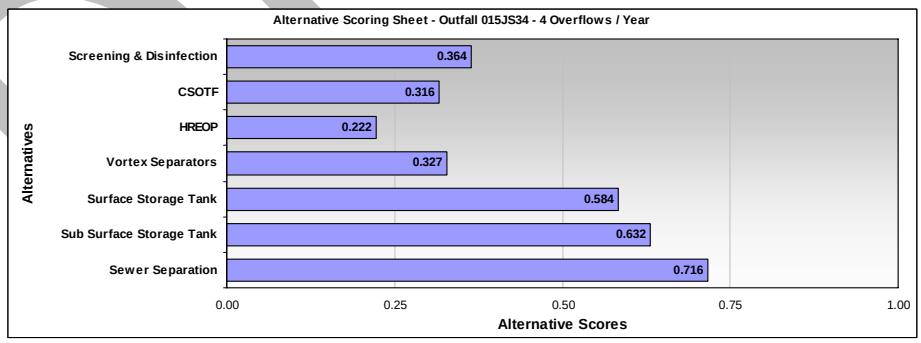
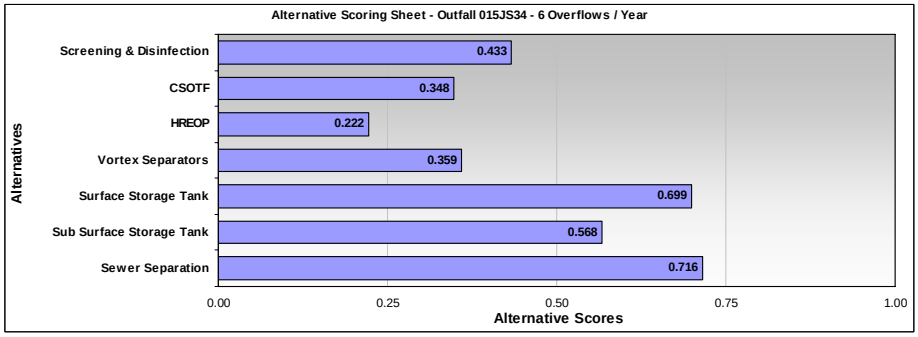
# Attachment 3 – Alternative Scoring Sheet

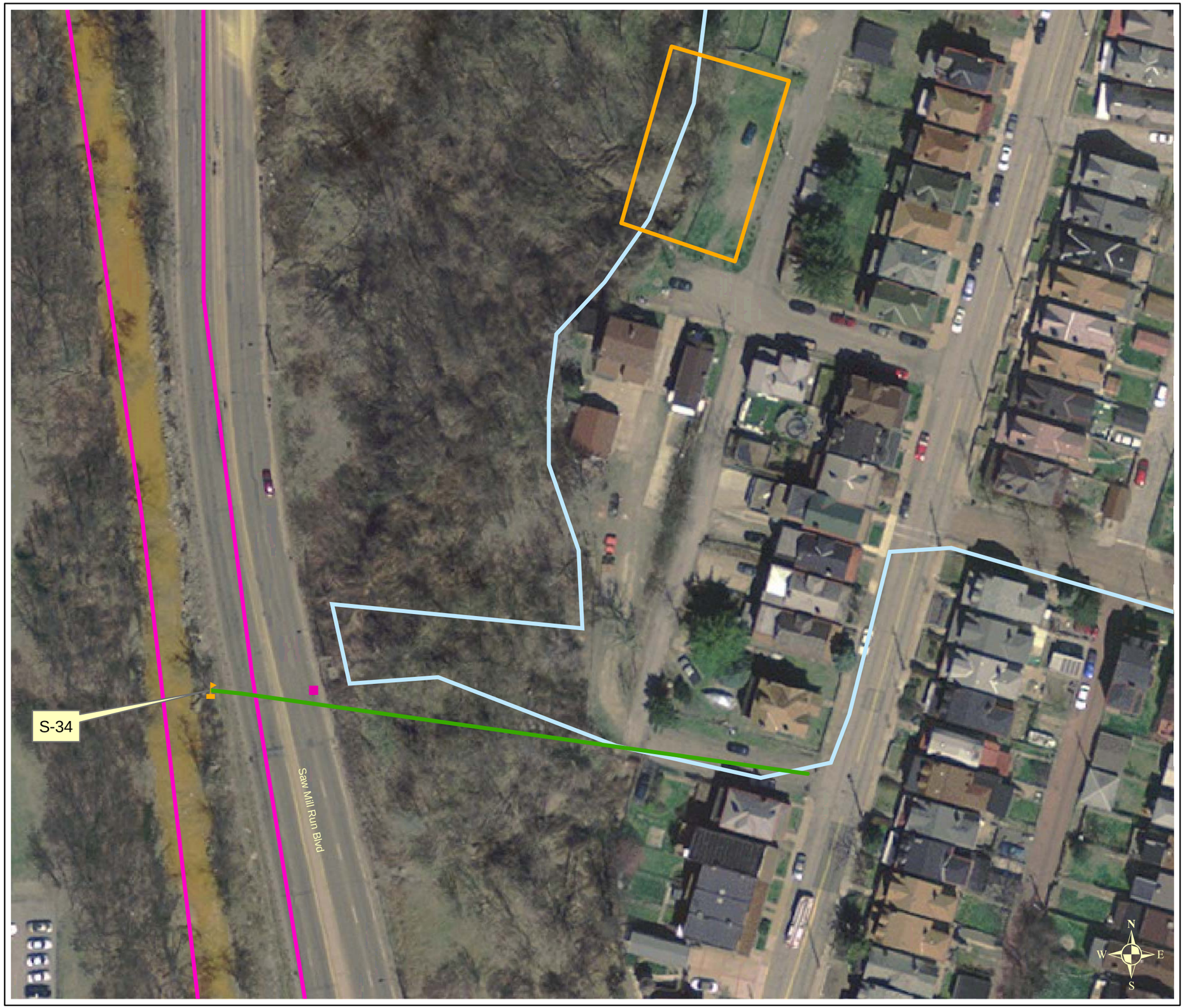


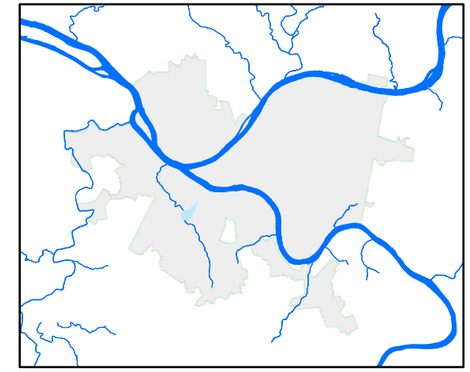





Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

50 0 50 Feet

# Attachment 4
# S-34
# Facilities Boundary Map
# Saw Mill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 2 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 4 | 4 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 4 | 3 | 3 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP. | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 3 | 3 | 2 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 2 | 1 | 2 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 2 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 2 | 1 | 2 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 3 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.717** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.606** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.747** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.747** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.568** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.678** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.593** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.561** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.561** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.359** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.428** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.380** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.380** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

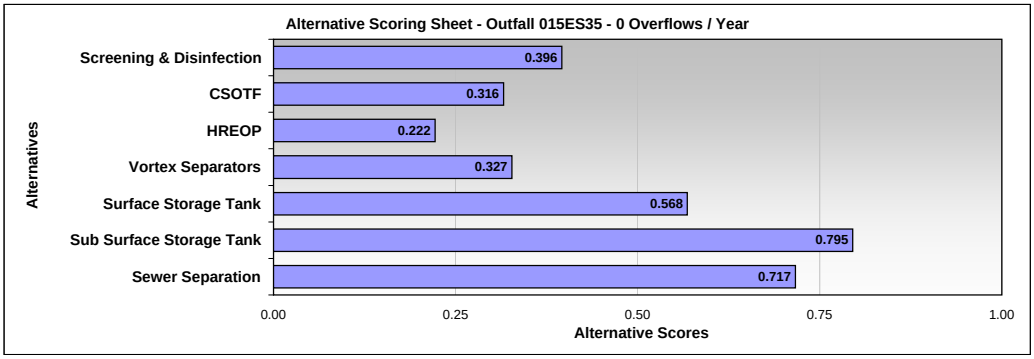
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.433** |

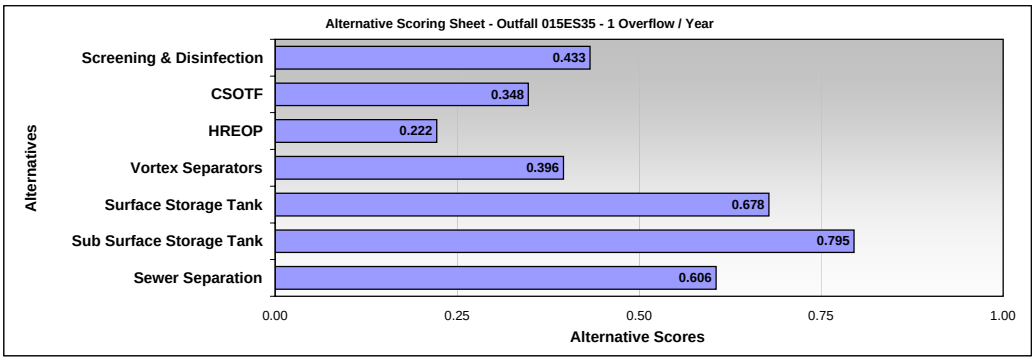
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.428** |

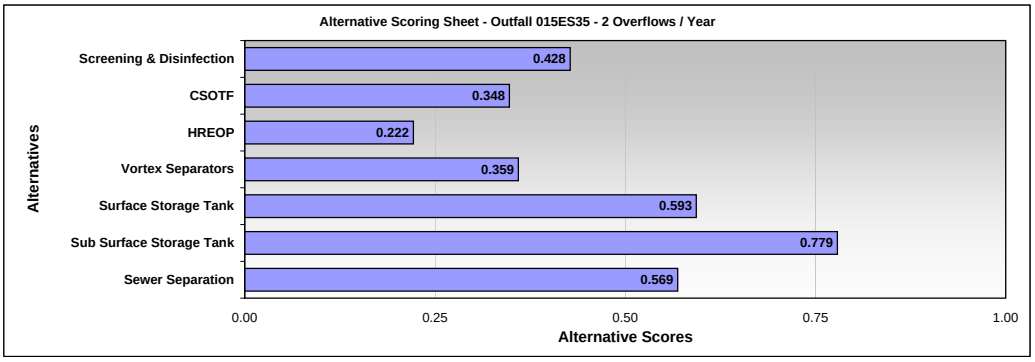
Total Score

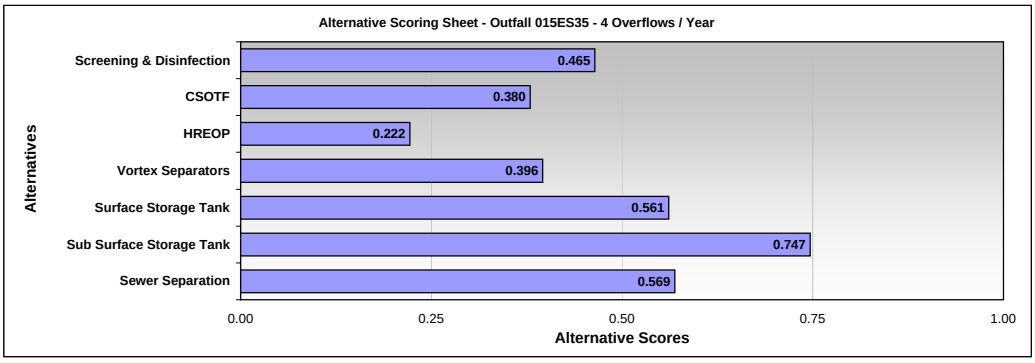
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.465** |

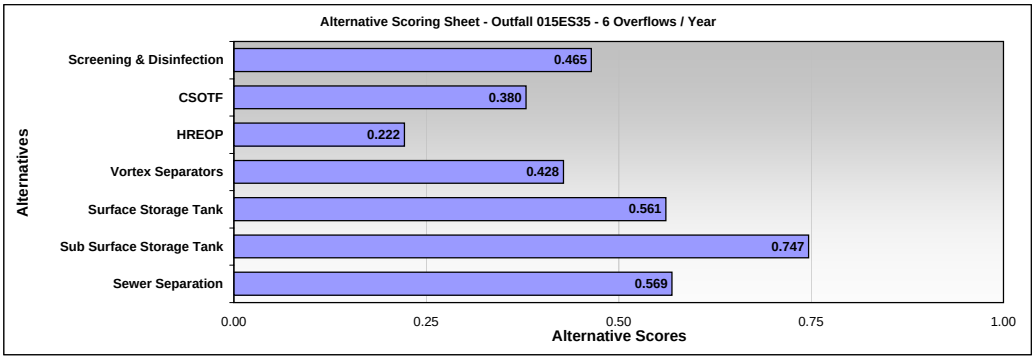
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.465** |


Alternative Scoring Sheet - Outfall 015ES35 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.316
0.222
0.327
0.568
0.795
0.717
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015ES35 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.433
0.348
0.222
0.396
0.678
0.795
0.606
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015ES35 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.428
0.348
0.222
0.359
0.593
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015ES35 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.465
0.380
0.222
0.396
0.561
0.747
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015ES35 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.465
0.380
0.222
0.428
0.561
0.747
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 33 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **4,950,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 14,375 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **29,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,018,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.29 | 39,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.35 | 46,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 69 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 46 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.36 | 47,610 | **Sufficient Volume** |
| Tank Area (SF) | | 3,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **248,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 13.98 | 21.63 | = Peak Rate |
| Force Main Diameter (In) | | 26 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,357,000** | **$ 34,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 21.63 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 69,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 350 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **40,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 13.98 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 24,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **4,888,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.29 | 39,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.35 | 46,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 69 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 46 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.36 | 47,610 | **Sufficient Volume** |
| Tank Area (SF) | | 3,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,819,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.29 | 0.45 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 4 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **534,000** | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 21.63 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 69,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,450 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **242,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 13.98 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 24,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,818,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.98 | | 21.63 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 2 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,512,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 15.37 | | 23.79 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 27 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,527,000** | **$** | **35,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.63 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 58,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 2,900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **211,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 13.98 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 15.37 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 62 | | 30 | |
| Passes / Detention (Min) | | 3 | | 15.64 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **654,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 15,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **30,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,390,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.98 | | 21.63 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 70 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 35 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.22 | | 29,400 | |
| **Construction Cost (CSOTF)** | **$** | **16,377,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.98 | | 21.63 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 26 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,357,000** | **$** | **34,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.63 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 44,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **170,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 13.98 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 13.98 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | | 28 | |
| Passes / Detention (Min) | | 3 | | **15.28** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **627,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 11,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **22,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **21,748,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 13.98 | | 21.63 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 170 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 19 | | **OK** | Input by Engineer |
| Width (Ft) | | 10 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,401,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 15.37 | | 23.79 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 27 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,527,000** | **$** | **35,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.63 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 250 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **31,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 13.98 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 15.37 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 62 | | 30 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.64** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 654,000 | $ | 535,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,189,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 28,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **56,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **9,400,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 39,265 | CF |
| | 0.29 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 21.63 | CFS |
| | 13.98 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 13.98 | | 21.63 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,059,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 13.98 | | 21.63 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 26 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,357,000** | **$** | **34,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 21.63 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 220 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **28,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 13.98 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | | 28 | |
| Passes / Detention (Min) | | 3 | | **15.28** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 627,000 | $ | 500,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,127,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,755,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 33 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **4,950,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 14,375 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **29,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,018,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 27,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.24 | | 32,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 58 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 39 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.25 | | 33,930 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **165,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 5.15 | | 7.96 | = Peak Rate |
| Force Main Diameter (In) | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,225,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 48,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 240 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **30,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,242,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 27,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.24 | | 32,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 58 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 39 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.25 | | 33,930 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,535,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.20 | | 0.31 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **456,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 48,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **182,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,984,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | | 7.96 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.66 | | 8.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,299,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.66 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | | 18 | |
| Passes | | 3 | | **15.62** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **457,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,804,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | 7.96 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 43 | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 22 | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | 11,352 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 5.15 | 7.96 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,225,000** | **$ 25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.96 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **81,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 5.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 5.15 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | 18 | |
| Passes | | 3 | 16.27 | Ref: Tech Param-15 min minimum |
| | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **446,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **19,934,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 5.15 | | 7.96 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 70 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 13 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,007,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.66 | | 8.76 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,299,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.96 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 5.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.66 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 38 | | 18 | Input by Engineer |
| Passes | | 3 | | **15.62** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 457,000 | $ | 311,000 | |
| **Construction Cost (Disinfection)** | **$** | **768,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,915,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 26,965 | CF |
| | 0.20 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 7.96 | CFS |
| | 5.15 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 5.15 | | 7.96 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **651,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 5.15 | | 7.96 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,225,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.96 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 5.15 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | | 18 | |
| Passes | | 3 | | **16.27** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 446,000 | $ | 301,000 | |
| **Construction Cost (Disinfection)** | **$** | **747,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,809,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 33 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **4,950,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 14,375 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **29,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **5,018,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.07 | | 10,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.09 | | 12,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 36 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 24 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 12,960 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **55,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 3.53 | | 5.46 | = Peak Rate |
| Force Main Diameter (In) | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,973,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.46 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 90 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **14,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 3.53 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **576,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,782,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.07 | | 10,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.09 | | 12,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 36 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 24 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 12,960 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,142,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.07 | | 0.11 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **347,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 5.46 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 18,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **84,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.53 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **576,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,304,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.53 | | 5.46 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.88 | | 6.01 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,031,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.46 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.53 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **576,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.88 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | | 15 | |
| Passes | | 3 | | **15.98** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **420,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 4,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **8,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,420,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.53 | 5.46 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.53 | 5.46 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 13 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,973,000** | **$ 22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 5.46 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.53 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **576,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.53 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | 15 | |
| Passes | | 3 | **16.48** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **412,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,551,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.53 | | 5.46 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 50 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 11 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,753,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.88 | | 6.01 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 14 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,031,000** | **$** | **23,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.46 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.53 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **576,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.88 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 32 | | 15 | Input by Engineer |
| Passes | | 3 | | **15.98** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 420,000 | $ | 265,000 | |
| **Construction Cost (Disinfection)** | **$** | **685,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,231,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 9,886 | CF |
| | 0.07 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 5.46 | CFS |
| | 3.53 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.53 | | 5.46 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **576,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.53 | | 5.46 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,973,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 5.46 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 60 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.53 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 30 | | 15 | |
| Passes | | 3 | | **16.48** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 412,000 | $ | 255,000 | |
| **Construction Cost (Disinfection)** | **$** | **667,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,396,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 33 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **4,950,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 14,375 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **29,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,018,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **37,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.20 | | 3.40 | = Peak Rate |
| Force Main Diameter (In) | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,745,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.40 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.20 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **514,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,467,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,071,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **328,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.40 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.20 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **514,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,129,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.20 | | 3.40 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.42 | | 3.74 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,784,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.40 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.20 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **514,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.42 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | |
| Passes | | 3 | | **16.04** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **389,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,073,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.20 | | 3.40 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.20 | | 3.40 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,745,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.40 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.20 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **514,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.20 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 12 | |
| Passes | | 3 | | **16.94** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **384,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **19,216,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.20 | | 3.40 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,545,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.42 | | 3.74 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 11 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,784,000** | **$** | **20,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.40 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.20 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **514,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.42 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 25 | | 12 | Input by Engineer |
| Passes | | 3 | | **16.04** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 389,000 | $ | 218,000 | |
| **Construction Cost (Disinfection)** | **$** | **607,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **4,627,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,824 | CF |
| | 0.05 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.40 | CFS |
| | 2.20 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.20 | | 3.40 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **514,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.20 | | 3.40 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,745,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.40 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 40 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **7,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.20 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 12 | |
| Passes | | 3 | | **16.94** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 384,000 | $ | 213,000 | |
| **Construction Cost (Disinfection)** | **$** | **597,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,030,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 33 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **4,950,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 14,375 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **29,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **5,018,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **30,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.07 | | 3.20 | = Peak Rate |
| Force Main Diameter (In) | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,722,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.20 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **508,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,431,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,044,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.07 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 12.0 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **320,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 3.20 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 550 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **57,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **508,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,083,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.07 | | 3.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.28 | | 3.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,759,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **508,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 12 | |
| Passes | | 3 | | **16.35** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **386,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 2,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **4,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,038,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.07 | 3.20 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 400 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 29 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 15 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.04 | 5,220 | |
| **Construction Cost (CSOTF)** | **$** | **16,395,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.07 | 3.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,722,000** | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 3.20 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 400 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.07 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **508,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.07 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | 11 | |
| Passes | | 3 | **15.79** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **381,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 19,184,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.07 | | 3.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 30 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 9 | | **OK** | Input by Engineer |
| Width (Ft) | | 4 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,525,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.28 | | 3.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 10 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,759,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **508,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 2.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 24 | | 12 | Input by Engineer |
| Passes | | 3 | | **16.35** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 386,000 | $ | 213,000 | |
| **Construction Cost (Disinfection)** | **$** | **599,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **4,567,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 62 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,643 | CF |
| | 0.04 | MG |
| Total Volume | 177,498 | CF |
| | 1.33 | MG |
| Peak Rate | 3.20 | CFS |
| | 2.07 | MGD |

| Capital Costs - 015ES35 / Sewershed ACSO 015ES35 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.07 | | 3.20 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **508,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.07 | | 3.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 10 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,722,000** | **$** | **19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 3.20 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 30 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **6,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.07 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 23 | | 11 | |
| Passes | | 3 | | **15.79** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 381,000 | $ | 205,000 | |
| **Construction Cost (Disinfection)** | **$** | **586,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **2,989,000** | | | |

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| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 13.98 | $109,476 | 20 | 10.910 | $1,194,374 |
| | Tank O&M | No. Events / Yr | 62 | $38,713 | 50 | 14.484 | $560,700 |
| | | Const Cost ($) | $248,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 14 | $8,630 | 20 | 10.910 | $94,149 |
| | Odor Control O&M | Capacity (cfm) | 350 | $1,225 | 20 | 10.910 | $13,365 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,686 |
| | | | **Total Annual O&M** | **$159,000** | | **Total PW O&M** | **$1,879,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.29 | $8,291 | 20 | 10.910 | $90,453 |
| | Tank O&M | No. Events / Yr | 62 | $42,640 | 50 | 14.484 | $617,585 |
| | | Const Cost ($) | $1,819,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 14 | $8,630 | 20 | 10.910 | $94,149 |
| | Odor Control O&M | Capacity (cfm) | 3,450 | $12,075 | 20 | 10.910 | $131,738 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,717 |
| | | | **Total Annual O&M** | **$72,000** | | **Total PW O&M** | **$940,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 13.98 | $109,476 | 20 | 10.910 | $1,194,374 |
| | Sed. Basin O&M | Flow Rate (mgd) | 13.98 | $1,572 | 50 | 14.484 | $22,772 |
| | Screening O&M | Flow Rate (mgd) | 13.98 | $8,630 | 20 | 10.910 | $94,149 |
| | Disinfection O&M | Flow Rate (mgd) | 13.98 | $80,178 | 20 | 10.910 | $874,732 |
| | Odor Control O&M | Capacity (cfm) | 2,200.00 | $7,700 | 20 | 10.910 | $84,007 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,745 |
| | | | **Total Annual O&M** | **$208,000** | | **Total PW O&M** | **$2,289,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 15.37 | $116,674 | 20 | 10.910 | $1,272,901 |
| | HREP O&M | Flow Rate (mgd) | 13.98 | $109,851 | 20 | 10.910 | $1,198,472 |
| | Screening O&M | Flow Rate (mgd) | 13.98 | $8,630 | 20 | 10.910 | $94,149 |
| | Disinfection O&M | Flow Rate (mgd) | 15.37 | $84,971 | 20 | 10.910 | $927,025 |
| | Odor Control O&M | Capacity (cfm) | 250.00 | $875 | 20 | 10.910 | $9,546 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $28,385 |
| | | | **Total Annual O&M** | **$322,000** | | **Total PW O&M** | **$3,530,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 15.37 | $116,674 | 20 | 10.910 | $1,272,901 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 13.98 | $1,572 | 20 | 10.910 | $17,154 |
| | Screening O&M | Flow Rate (mgd) | 13.98 | $8,630 | 20 | 10.910 | $94,149 |
| | Disinfection O&M | Flow Rate (mgd) | 15.37 | $84,971 | 20 | 10.910 | $927,025 |
| | Odor Control O&M | Capacity (cfm) | 2,900.00 | $10,150 | 20 | 10.910 | $110,736 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,680 |
| | | | **Total Annual O&M** | **$222,000** | | **Total PW O&M** | **$2,444,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 13.98 | $109,476 | 20 | 10.910 | $1,194,374 |
| | Screening O&M | Flow Rate (mgd) | 13.98 | $8,630 | 20 | 10.910 | $94,149 |
| | Disinfection O&M | Flow Rate (mgd) | 13.98 | $80,178 | 20 | 10.910 | $874,732 |
| | Odor Control O&M | Capacity (cfm) | 220.00 | $770 | 20 | 10.910 | $8,401 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,359 |
| | | | **Total Annual O&M** | **$200,000** | | **Total PW O&M** | **$2,190,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,162 | 20 | 10.910 | $612,727 |
| | Tank O&M | No. Events / Yr | 62 | $38,505 | 50 | 14.484 | $557,695 |
| | | Const Cost ($) | $165,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,867 | 20 | 10.910 | $85,828 |
| | Odor Control O&M | Capacity (cfm) | 240 | $840 | 20 | 10.910 | $9,164 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,930 |
| | | | **Total Annual O&M** | **$104,000** | | **Total PW O&M** | **$1,276,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.20 | $6,450 | 20 | 10.910 | $70,370 |
| | Tank O&M | No. Events / Yr | 62 | $41,930 | 50 | 14.484 | $607,301 |
| | | Const Cost ($) | $1,535,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,867 | 20 | 10.910 | $85,828 |
| | Odor Control O&M | Capacity (cfm) | 2,400 | $8,400 | 20 | 10.910 | $91,643 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,126 |
| | | | **Total Annual O&M** | **$65,000** | | **Total PW O&M** | **$859,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,162 | 20 | 10.910 | $612,727 |
| | Sed. Basin O&M | Flow Rate (mgd) | 5.15 | $579 | 50 | 14.484 | $8,386 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.15 | $43,625 | 20 | 10.910 | $475,945 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,282 |
| | | | **Total Annual O&M** | **$112,000** | | **Total PW O&M** | **$1,228,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.66 | $59,855 | 20 | 10.910 | $653,012 |
| | HREP O&M | Flow Rate (mgd) | 5.15 | $61,044 | 20 | 10.910 | $665,985 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.66 | $46,233 | 20 | 10.910 | $504,398 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,894 |
| | | | **Total Annual O&M** | **$176,000** | | **Total PW O&M** | **$1,931,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.66 | $59,855 | 20 | 10.910 | $653,012 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 5.15 | $579 | 20 | 10.910 | $6,317 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.66 | $46,233 | 20 | 10.910 | $504,398 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,394 |
| | | | **Total Annual O&M** | **$115,000** | | **Total PW O&M** | **$1,262,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 5.15 | $56,162 | 20 | 10.910 | $612,727 |
| | Screening O&M | Flow Rate (mgd) | 5.15 | $7,867 | 20 | 10.910 | $85,828 |
| | Disinfection O&M | Flow Rate (mgd) | 5.15 | $43,625 | 20 | 10.910 | $475,945 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,097 |
| | | | **Total Annual O&M** | **$108,000** | | **Total PW O&M** | **$1,190,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.53 | $43,652 | 20 | 10.910 | $476,238 |
| | Tank O&M | No. Events / Yr | 62 | $38,230 | 50 | 14.484 | $553,712 |
| | | Const Cost ($) | $55,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,730 | 20 | 10.910 | $84,338 |
| | Odor Control O&M | Capacity (cfm) | 90 | $315 | 20 | 10.910 | $3,437 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,655 |
| | | | **Total Annual O&M** | **$90,000** | | **Total PW O&M** | **$1,127,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.07 | $3,299 | 20 | 10.910 | $35,996 |
| | Tank O&M | No. Events / Yr | 62 | $40,948 | 50 | 14.484 | $593,071 |
| | | Const Cost ($) | $1,142,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 4 | $7,730 | 20 | 10.910 | $84,338 |
| | Odor Control O&M | Capacity (cfm) | 900 | $3,150 | 20 | 10.910 | $34,366 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,211 |
| | | | **Total Annual O&M** | **$56,000** | | **Total PW O&M** | **$751,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.53 | $43,652 | 20 | 10.910 | $476,238 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.53 | $397 | 50 | 14.484 | $5,751 |
| | Screening O&M | Flow Rate (mgd) | 3.53 | $7,730 | 20 | 10.910 | $84,338 |
| | Disinfection O&M | Flow Rate (mgd) | 3.53 | $34,669 | 20 | 10.910 | $378,235 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,903 |
| | | | **Total Annual O&M** | **$89,000** | | **Total PW O&M** | **$978,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.88 | $46,522 | 20 | 10.910 | $507,549 |
| | HREP O&M | Flow Rate (mgd) | 3.53 | $48,899 | 20 | 10.910 | $533,491 |
| | Screening O&M | Flow Rate (mgd) | 3.53 | $7,730 | 20 | 10.910 | $84,338 |
| | Disinfection O&M | Flow Rate (mgd) | 3.88 | $36,741 | 20 | 10.910 | $400,847 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,805 |
| | | | **Total Annual O&M** | **$141,000** | | **Total PW O&M** | **$1,546,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.88 | $46,522 | 20 | 10.910 | $507,549 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.53 | $397 | 20 | 10.910 | $4,332 |
| | Screening O&M | Flow Rate (mgd) | 3.53 | $7,730 | 20 | 10.910 | $84,338 |
| | Disinfection O&M | Flow Rate (mgd) | 3.88 | $36,741 | 20 | 10.910 | $400,847 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,996 |
| | | | **Total Annual O&M** | **$92,000** | | **Total PW O&M** | **$1,008,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.53 | $43,652 | 20 | 10.910 | $476,238 |
| | Screening O&M | Flow Rate (mgd) | 3.53 | $7,730 | 20 | 10.910 | $84,338 |
| | Disinfection O&M | Flow Rate (mgd) | 3.53 | $34,669 | 20 | 10.910 | $378,235 |
| | Odor Control O&M | Capacity (cfm) | 60.00 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,764 |
| | | | **Total Annual O&M** | **$87,000** | | **Total PW O&M** | **$952,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.20 | $31,804 | 20 | 10.910 | $346,979 |
| | Tank O&M | No. Events / Yr | 62 | $38,185 | 50 | 14.484 | $553,060 |
| | | Const Cost ($) | $37,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,619 | 20 | 10.910 | $83,118 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,545 |
| | | | **Total Annual O&M** | **$78,000** | | **Total PW O&M** | **$994,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,576 | 20 | 10.910 | $28,100 |
| | Tank O&M | No. Events / Yr | 62 | $40,770 | 50 | 14.484 | $590,500 |
| | | Const Cost ($) | $1,071,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,619 | 20 | 10.910 | $83,118 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,902 |
| | | | **Total Annual O&M** | **$54,000** | | **Total PW O&M** | **$728,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.20 | $31,804 | 20 | 10.910 | $346,979 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.20 | $247 | 50 | 14.484 | $3,580 |
| | Screening O&M | Flow Rate (mgd) | 2.20 | $7,619 | 20 | 10.910 | $83,118 |
| | Disinfection O&M | Flow Rate (mgd) | 2.20 | $25,974 | 20 | 10.910 | $283,378 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,685 |
| | | | **Total Annual O&M** | **$68,000** | | **Total PW O&M** | **$742,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.42 | $33,895 | 20 | 10.910 | $369,792 |
| | HREP O&M | Flow Rate (mgd) | 2.20 | $37,004 | 20 | 10.910 | $403,713 |
| | Screening O&M | Flow Rate (mgd) | 2.20 | $7,619 | 20 | 10.910 | $83,118 |
| | Disinfection O&M | Flow Rate (mgd) | 2.42 | $27,527 | 20 | 10.910 | $300,318 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,962 |
| | | | **Total Annual O&M** | **$107,000** | | **Total PW O&M** | **$1,173,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.42 | $33,895 | 20 | 10.910 | $369,792 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.20 | $247 | 20 | 10.910 | $2,697 |
| | Screening O&M | Flow Rate (mgd) | 2.20 | $7,619 | 20 | 10.910 | $83,118 |
| | Disinfection O&M | Flow Rate (mgd) | 2.42 | $27,527 | 20 | 10.910 | $300,318 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,735 |
| | | | **Total Annual O&M** | **$70,000** | | **Total PW O&M** | **$766,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.20 | $31,804 | 20 | 10.910 | $346,979 |
| | Screening O&M | Flow Rate (mgd) | 2.20 | $7,619 | 20 | 10.910 | $83,118 |
| | Disinfection O&M | Flow Rate (mgd) | 2.20 | $25,974 | 20 | 10.910 | $283,378 |
| | Odor Control O&M | Capacity (cfm) | 40.00 | $140 | 20 | 10.910 | $1,527 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,581 |
| | | | **Total Annual O&M** | **$66,000** | | **Total PW O&M** | **$725,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.07 | $30,566 | 20 | 10.910 | $333,477 |
| | Tank O&M | No. Events / Yr | 62 | $38,168 | 50 | 14.484 | $552,807 |
| | | Const Cost ($) | $30,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,608 | 20 | 10.910 | $83,002 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $8,435 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$980,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,268 | 20 | 10.910 | $24,749 |
| | Tank O&M | No. Events / Yr | 62 | $40,703 | 50 | 14.484 | $589,523 |
| | | Const Cost ($) | $1,044,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 2 | $7,608 | 20 | 10.910 | $83,002 |
| | Odor Control O&M | Capacity (cfm) | 550 | $1,925 | 20 | 10.910 | $21,002 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,842 |
| | | | **Total Annual O&M** | **$53,000** | | **Total PW O&M** | **$721,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.07 | $30,566 | 20 | 10.910 | $333,477 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.07 | $233 | 50 | 14.484 | $3,374 |
| | Screening O&M | Flow Rate (mgd) | 2.07 | $7,608 | 20 | 10.910 | $83,002 |
| | Disinfection O&M | Flow Rate (mgd) | 2.07 | $25,051 | 20 | 10.910 | $273,305 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,566 |
| | | | **Total Annual O&M** | **$65,000** | | **Total PW O&M** | **$718,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 2.28 | $32,576 | 20 | 10.910 | $355,403 |
| | HREP O&M | Flow Rate (mgd) | 2.07 | $35,734 | 20 | 10.910 | $389,852 |
| | Screening O&M | Flow Rate (mgd) | 2.07 | $7,608 | 20 | 10.910 | $83,002 |
| | Disinfection O&M | Flow Rate (mgd) | 2.28 | $26,549 | 20 | 10.910 | $289,644 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,781 |
| | | | **Total Annual O&M** | **$103,000** | | **Total PW O&M** | **$1,134,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 2.28 | $32,576 | 20 | 10.910 | $355,403 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.07 | $233 | 20 | 10.910 | $2,541 |
| | Screening O&M | Flow Rate (mgd) | 2.07 | $7,608 | 20 | 10.910 | $83,002 |
| | Disinfection O&M | Flow Rate (mgd) | 2.28 | $26,549 | 20 | 10.910 | $289,644 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,608 |
| | | | **Total Annual O&M** | **$67,000** | | **Total PW O&M** | **$740,000** |

| ACSO 015ES35 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.07 | $30,566 | 20 | 10.910 | $333,477 |
| | Screening O&M | Flow Rate (mgd) | 2.07 | $7,608 | 20 | 10.910 | $83,002 |
| | Disinfection O&M | Flow Rate (mgd) | 2.07 | $25,051 | 20 | 10.910 | $273,305 |
| | Odor Control O&M | Capacity (cfm) | 30.00 | $105 | 20 | 10.910 | $1,146 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,460 |
| | | | **Total Annual O&M** | **$64,000** | | **Total PW O&M** | **$700,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.0 | $5,018,000 | $0 |
| 1 | $5.0 | $5,018,000 | $0 |
| 2 | $5.0 | $5,018,000 | $0 |
| 4 | $5.0 | $5,018,000 | $0 |
| 6 | $5.0 | $5,018,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $4.8 | $3,818,000 | $940,000 |
| 1 | $3.8 | $2,984,000 | $859,000 |
| 2 | $3.1 | $2,304,000 | $751,000 |
| 4 | $2.9 | $2,129,000 | $728,000 |
| 6 | $2.8 | $2,083,000 | $721,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $6.8 | $4,888,000 | $1,879,000 |
| 1 | $4.5 | $3,242,000 | $1,276,000 |
| 2 | $3.9 | $2,782,000 | $1,127,000 |
| 4 | $3.5 | $2,467,000 | $994,000 |
| 6 | $3.4 | $2,431,000 | $980,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $9.8 | $7,390,000 | $2,444,000 |
| 1 | $5.1 | $3,804,000 | $1,262,000 |
| 2 | $4.4 | $3,420,000 | $1,008,000 |
| 4 | $3.8 | $3,073,000 | $766,000 |
| 6 | $3.8 | $3,038,000 | $740,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.9 | $9,400,000 | $3,530,000 |
| 1 | $7.8 | $5,915,000 | $1,931,000 |
| 2 | $6.8 | $5,231,000 | $1,546,000 |
| 4 | $5.8 | $4,627,000 | $1,173,000 |
| 6 | $5.7 | $4,567,000 | $1,134,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $24.0 | $21,748,000 | $2,289,000 |
| 1 | $21.2 | $19,934,000 | $1,228,000 |
| 2 | $20.5 | $19,551,000 | $978,000 |
| 4 | $20.0 | $19,216,000 | $742,000 |
| 6 | $19.9 | $19,184,000 | $718,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.9 | $5,755,000 | $2,190,000 |
| 1 | $5.0 | $3,809,000 | $1,190,000 |
| 2 | $4.3 | $3,396,000 | $952,000 |
| 4 | $3.8 | $3,030,000 | $725,000 |
| 6 | $3.7 | $2,989,000 | $700,000 |

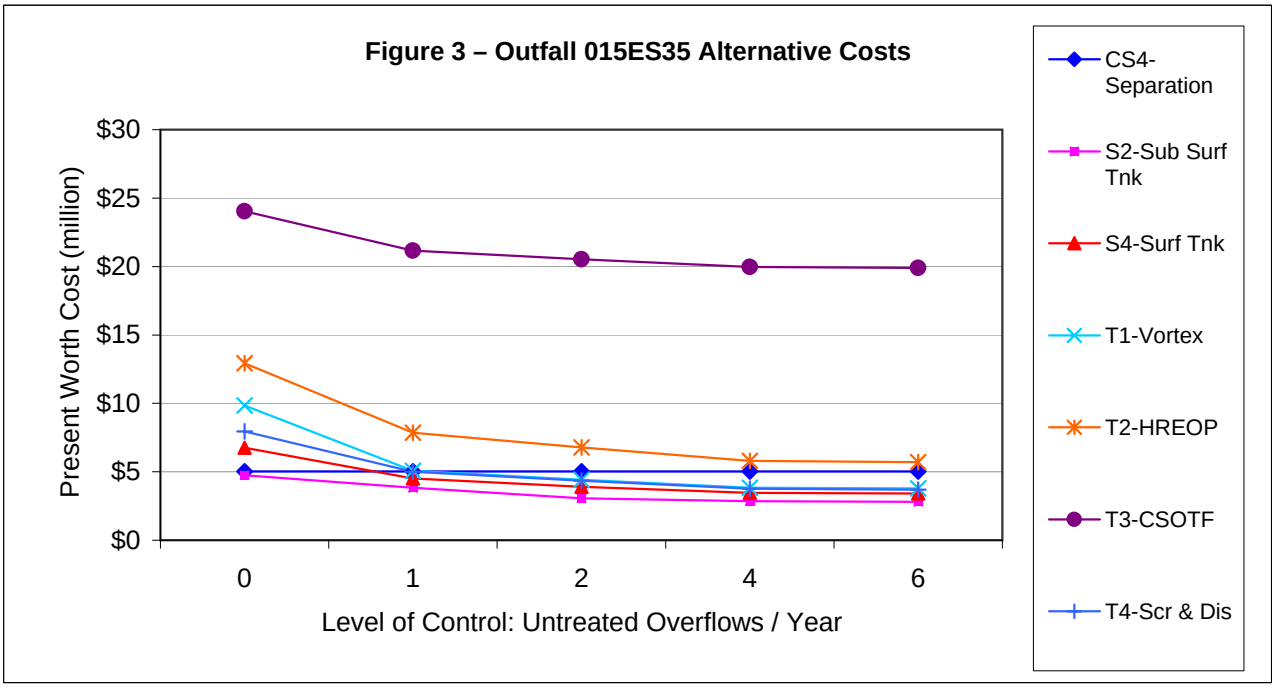
Figure 3 – Outfall 015ES35 Alternative Costs
Present Worth Cost (million)
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015ES35 |
| **Location Name** | S-35 |
| **Model ID** | ADC 015ES35-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015ES35 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 62 |
| Peak Volume: | 39,265 $ft^3$ |
| | 0.29 MG |
| Total Volume: | 177,498 $ft^3$ |
| | 1.33 MG |
| Peak Rate: | 21.63 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:15 | 67 | 8/20/2005 19:00 | 39265.31 | 293.724 | 0 | 21.63 | 0 |
| 1/5/2005 13:07 | 1362 | 1/5/2005 14:45 | 26965.29 | 201.714 | 1 | 1.24 | 19 |
| 5/13/2005 22:30 | 112 | 5/13/2005 22:45 | 9886.43 | 73.955 | 2 | 5.46 | 2 |
| 7/26/2005 19:45 | 35 | 7/26/2005 19:55 | 9183.90 | 68.700 | 3 | 7.96 | 1 |
| 7/5/2005 16:15 | 64 | 7/5/2005 17:00 | 6824.30 | 51.049 | 4 | 3.20 | 6 |
| 7/15/2005 17:30 | 49 | 7/15/2005 18:00 | 5703.46 | 42.665 | 5 | 3.10 | 8 |
| 11/29/2005 6:45 | 306 | 11/29/2005 7:00 | 5643.08 | 42.213 | 6 | 1.12 | 23 |
| 4/23/2005 3:35 | 63 | 4/23/2005 3:55 | 5281.56 | 39.509 | 7 | 3.26 | 5 |
| 11/14/2005 21:45 | 380 | 11/14/2005 23:00 | 5124.11 | 38.331 | 8 | 1.13 | 22 |
| 3/28/2005 9:01 | 619 | 3/28/2005 19:00 | 4020.25 | 30.074 | 9 | 0.87 | 27 |
| 8/29/2005 11:06 | 164 | 8/29/2005 13:45 | 3728.67 | 27.892 | 10 | 3.60 | 3 |
| 1/11/2005 8:45 | 544 | 1/11/2005 11:30 | 3378.22 | 25.271 | 11 | 0.98 | 25 |
| 7/21/2005 14:20 | 30 | 7/21/2005 14:40 | 3326.27 | 24.882 | 12 | 3.14 | 7 |
| 9/29/2005 5:30 | 20 | 9/29/2005 5:45 | 3020.62 | 22.596 | 13 | 3.40 | 4 |
| 11/9/2005 19:20 | 29 | 11/9/2005 19:40 | 2910.63 | 21.773 | 14 | 2.97 | 9 |
| 5/11/2005 22:35 | 90 | 5/11/2005 22:45 | 2762.04 | 20.661 | 15 | 1.44 | 18 |
| 1/8/2005 4:45 | 76 | 1/8/2005 5:15 | 2553.57 | 19.102 | 16 | 1.04 | 24 |
| 5/23/2005 16:15 | 34 | 5/23/2005 16:30 | 2442.17 | 18.269 | 17 | 2.37 | 12 |
| 5/14/2005 16:00 | 64 | 5/14/2005 16:15 | 2440.77 | 18.258 | 18 | 1.86 | 15 |
| 1/12/2005 0:45 | 168 | 1/12/2005 1:30 | 2335.61 | 17.472 | 19 | 1.16 | 21 |
| 8/27/2005 15:15 | 23 | 8/27/2005 15:30 | 2170.06 | 16.233 | 20 | 2.85 | 10 |
| 1/3/2005 13:00 | 442 | 1/3/2005 13:45 | 1919.64 | 14.360 | 21 | 0.42 | 38 |
| 4/2/2005 5:51 | 238 | 4/2/2005 6:30 | 1820.56 | 13.619 | 22 | 0.50 | 36 |
| 2/9/2005 15:16 | 97 | 2/9/2005 16:45 | 1817.01 | 13.592 | 23 | 1.67 | 16 |
| 1/14/2005 0:17 | 137 | 1/14/2005 2:15 | 1622.54 | 12.137 | 24 | 0.79 | 31 |
| 7/25/2005 13:15 | 20 | 7/25/2005 13:30 | 1622.41 | 12.136 | 25 | 2.44 | 11 |
| 9/16/2005 21:30 | 20 | 9/16/2005 21:45 | 1610.11 | 12.044 | 26 | 2.19 | 13 |
| 2/20/2005 19:45 | 52 | 2/20/2005 20:30 | 1572.42 | 11.763 | 27 | 0.77 | 32 |
| 1/5/2005 3:00 | 229 | 1/5/2005 5:00 | 1522.13 | 11.386 | 28 | 0.42 | 40 |
| 11/9/2005 4:15 | 20 | 11/9/2005 4:30 | 1453.20 | 10.871 | 29 | 2.07 | 14 |
| 5/28/2005 8:35 | 59 | 5/28/2005 9:05 | 1434.80 | 10.733 | 30 | 0.49 | 37 |
| 7/12/2005 19:35 | 42 | 7/12/2005 20:00 | 1351.61 | 10.111 | 31 | 1.23 | 20 |
| 10/22/2005 6:27 | 37 | 10/22/2005 6:55 | 1221.66 | 9.139 | 32 | 0.71 | 33 |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 10/7/2005 10:16 | 48 | 10/7/2005 10:45 | 1029.98 | 7.705 | 33 | 0.70 | 34 |
| 7/17/2005 16:25 | 24 | 7/17/2005 16:45 | 814.78 | 6.095 | 34 | 0.83 | 29 |
| 6/11/2005 17:45 | 20 | 6/11/2005 18:00 | 748.14 | 5.596 | 35 | 0.97 | 26 |
| 6/28/2005 18:05 | 15 | 6/28/2005 18:15 | 681.88 | 5.101 | 36 | 1.56 | 17 |
| 12/15/2005 13:45 | 20 | 12/15/2005 14:00 | 568.78 | 4.255 | 37 | 0.65 | 35 |
| 10/22/2005 16:15 | 33 | 10/22/2005 16:30 | 440.24 | 3.293 | 38 | 0.42 | 41 |
| 2/14/2005 9:36 | 614 | 2/14/2005 19:45 | 437.56 | 3.273 | 39 | 0.38 | 44 |
| 8/26/2005 20:50 | 16 | 8/26/2005 21:00 | 423.46 | 3.168 | 40 | 0.81 | 30 |
| 8/8/2005 8:50 | 58 | 8/8/2005 9:00 | 403.57 | 3.019 | 41 | 0.42 | 39 |
| 10/21/2005 19:00 | 93 | 10/21/2005 19:15 | 354.67 | 2.653 | 42 | 0.23 | 52 |
| 5/7/2005 13:15 | 19 | 5/7/2005 13:30 | 330.24 | 2.470 | 43 | 0.41 | 42 |
| 3/27/2005 16:50 | 73 | 3/27/2005 17:00 | 310.03 | 2.319 | 44 | 0.39 | 43 |
| 2/16/2005 7:00 | 76 | 2/16/2005 7:15 | 309.53 | 2.315 | 45 | 0.34 | 48 |
| 11/16/2005 4:10 | 19 | 11/16/2005 4:15 | 307.05 | 2.297 | 46 | 0.85 | 28 |
| 6/3/2005 9:00 | 19 | 6/3/2005 9:15 | 290.16 | 2.171 | 47 | 0.34 | 47 |
| 10/21/2005 7:15 | 19 | 10/21/2005 7:30 | 289.96 | 2.169 | 48 | 0.36 | 46 |
| 11/1/2005 16:06 | 28 | 11/1/2005 16:30 | 262.82 | 1.966 | 49 | 0.25 | 50 |
| 9/23/2005 2:50 | 14 | 9/23/2005 3:00 | 217.11 | 1.624 | 50 | 0.37 | 45 |
| 9/26/2005 9:21 | 28 | 9/26/2005 9:45 | 213.82 | 1.599 | 51 | 0.17 | 54 |
| 10/25/2005 2:02 | 106 | 10/25/2005 3:45 | 206.68 | 1.546 | 52 | 0.22 | 53 |
| 6/14/2005 19:10 | 23 | 6/14/2005 19:15 | 202.33 | 1.514 | 53 | 0.28 | 49 |
| 4/20/2005 19:31 | 227 | 4/20/2005 23:15 | 182.94 | 1.368 | 54 | 0.16 | 55 |
| 5/28/2005 17:20 | 71 | 5/28/2005 17:30 | 159.47 | 1.193 | 55 | 0.24 | 51 |
| 3/23/2005 12:17 | 30 | 3/23/2005 12:30 | 122.81 | 0.919 | 56 | 0.09 | 58 |
| 4/22/2005 16:01 | 120 | 4/22/2005 16:15 | 102.53 | 0.767 | 57 | 0.09 | 57 |
| 3/23/2005 2:32 | 16 | 3/23/2005 2:45 | 89.89 | 0.672 | 58 | 0.13 | 56 |
| 11/8/2005 15:04 | 12 | 11/8/2005 15:15 | 28.12 | 0.210 | 59 | 0.04 | 60 |
| 10/26/2005 7:26 | 6 | 10/26/2005 7:30 | 19.65 | 0.147 | 60 | 0.08 | 59 |
| 12/15/2005 20:09 | 7 | 12/15/2005 20:15 | 15.80 | 0.118 | 61 | 0.04 | 61 |

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ACSO 015E335.

## Region 1

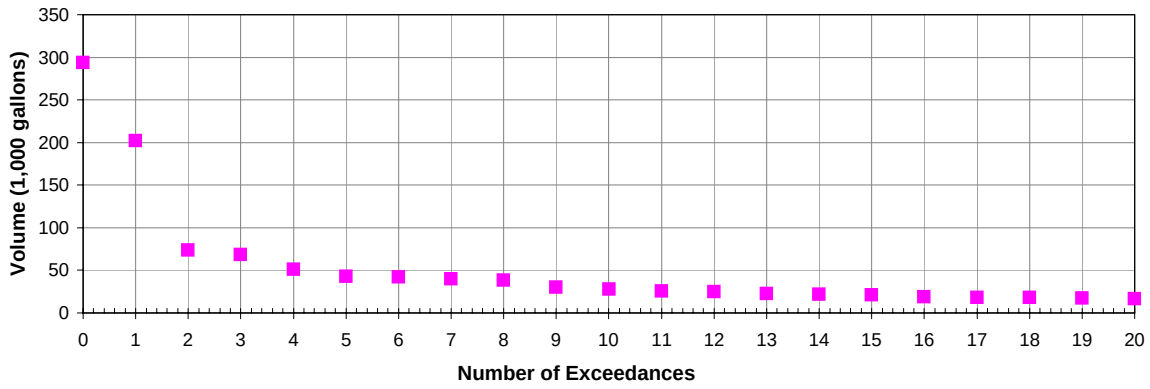
### PWSA CSO DISCHARGES
### for "Typical Year - 2005"
### Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015ES35 |
| **Location Name** | S-35 |
| **Model ID** | ADC 015ES35-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015ES35 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

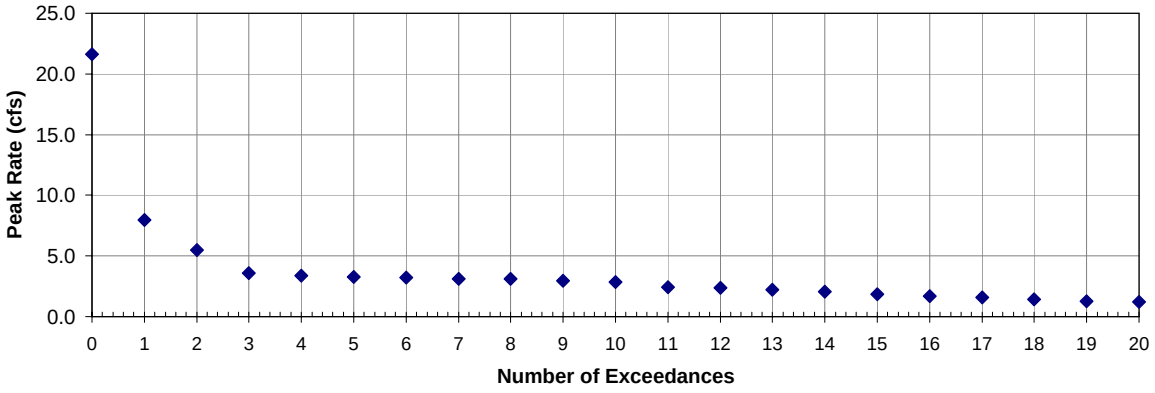
**Results Summary**

| | |
|---|---|
| Number of Events: | 62 |
| Peak Volume: | 39,265 $ft^3$ |
| | 0.29 MG |
| Total Volume: | 177,498 $ft^3$ |
| | 1.33 MG |
| Peak Rate: | 21.63 cfs |

### Figure 1 - Outfall 015ES35 CSO Volume




### Figure 2 - Outfall 015ES35 CSO Peak Flow Rate



## D.26.7 0-14 – SAW MILL RUN INTERCEPTOR SEWERSHED – S-35 – NPDES #015ES35

### Description of Outfall

Outfall 015ES35 conveys overflows from ALCOSAN diversion chamber S-35 to Saw Mill Run, and ultimately into the Ohio River. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run, near Saw Mill Run Boulevard. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 015ES35 Sewershed (S-35) consists of 33 acres, or approximately 0.70% of the total service area. The Sawmill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 015ES35 typically experiences 62 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015ES35 is approximately 0.29 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015ES35 is approximately 21.63 CFS. *Figure 1 – Outfall 015ES35 CSO Volume* and *Figure 2 – Outfall 015ES35 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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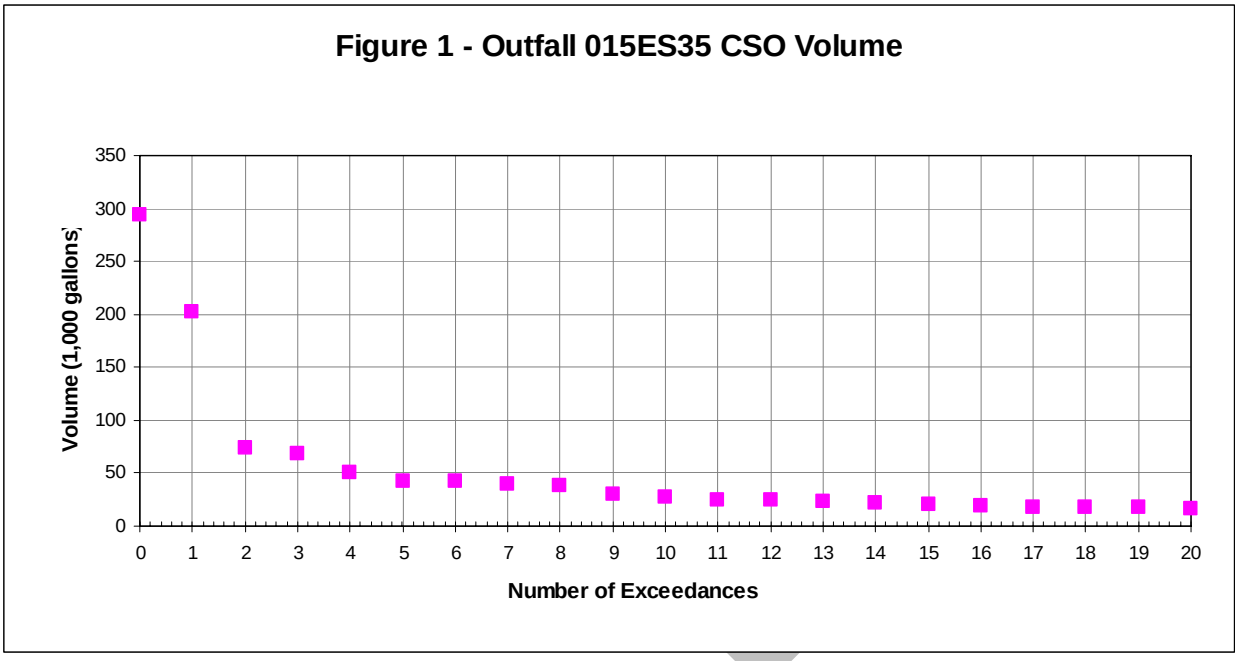


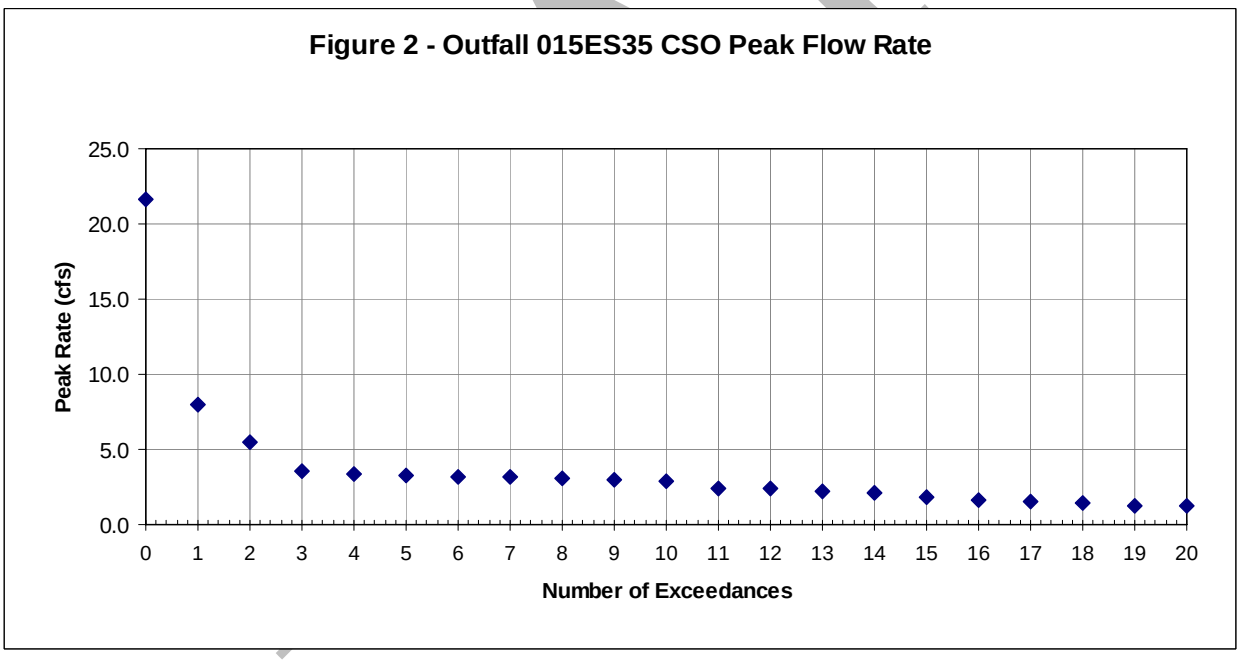


There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 015ES35, between Saw Mill Run Boulevard and the creek. The site is generally bounded by Saw Mill Run to the west, Saw Mill Run Boulevard to the east and private development to the north and south.


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## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015ES35. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-015ES35: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-015ES35: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015ES35: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-015ES35: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015ES35: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015ES35: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-015ES35: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

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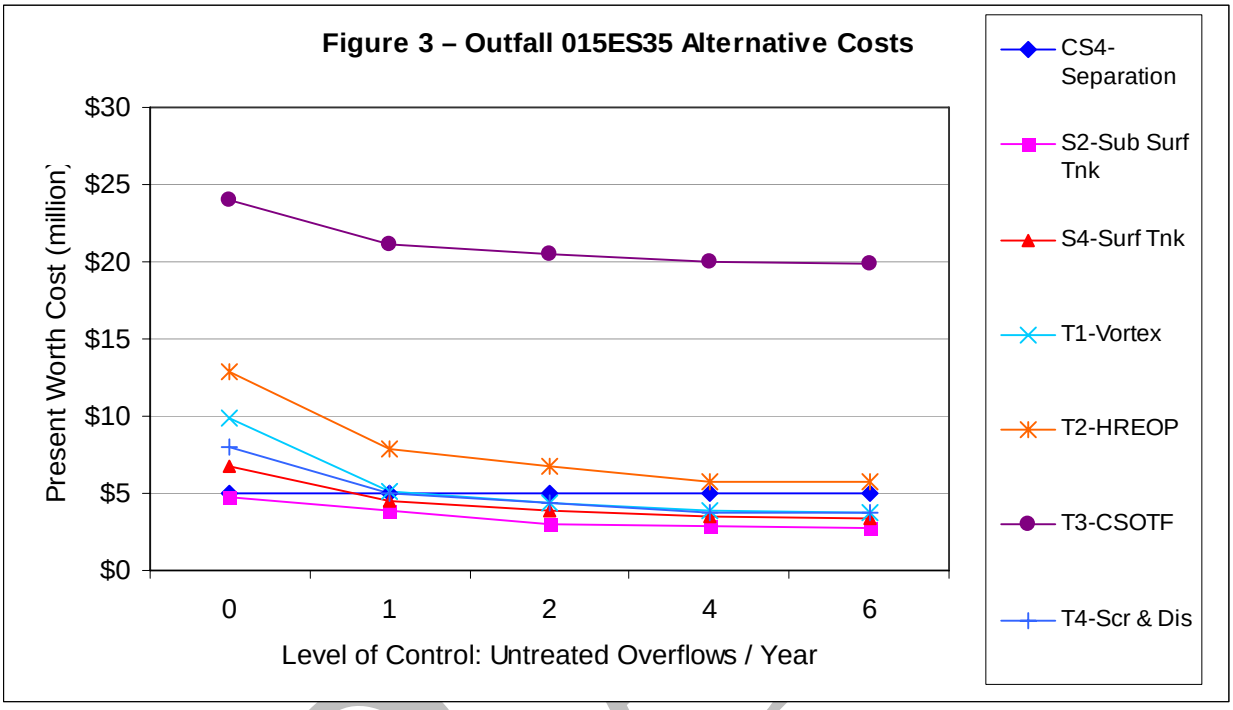
*Figure 3 – Outfall 015ES35 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-015ES35: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.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**Significant Issues**

It appears that sufficient space exists to construct a sub-surface storage facility for all control levels.

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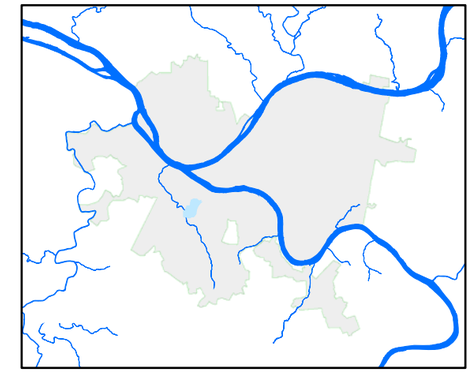


Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

300 0 300
Feet

# Attachment 1
# S-35
# Tributary Area Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality

SW-D-0218.pdf

# Attachment 2 - CSO Alternatives Development Worksheet

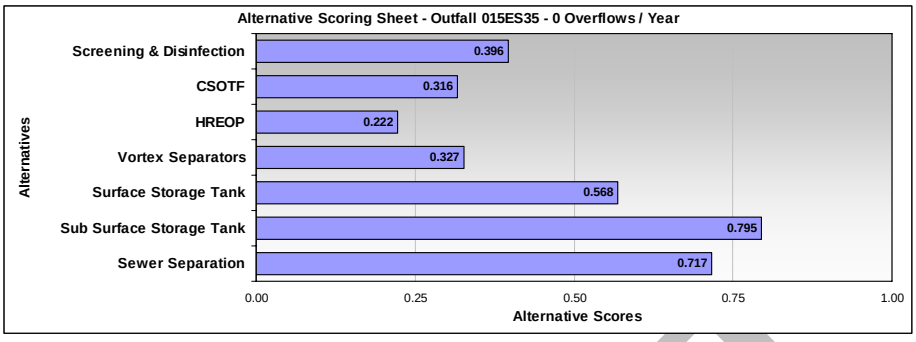
| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 33 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

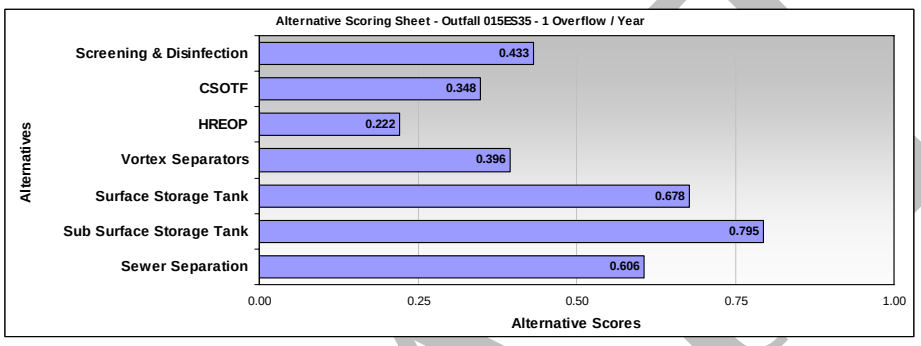
DRAFT

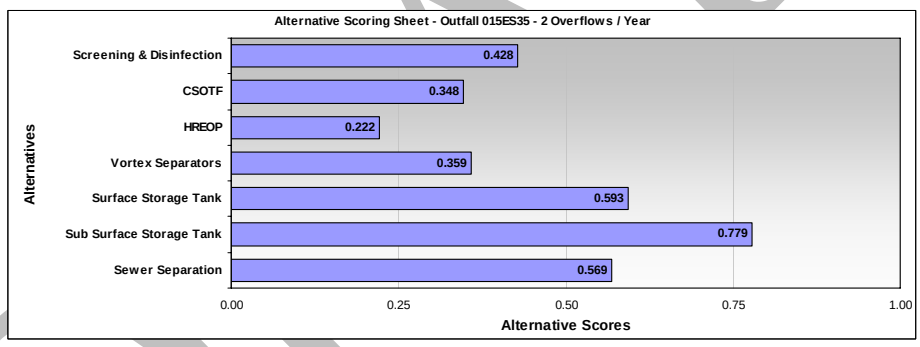


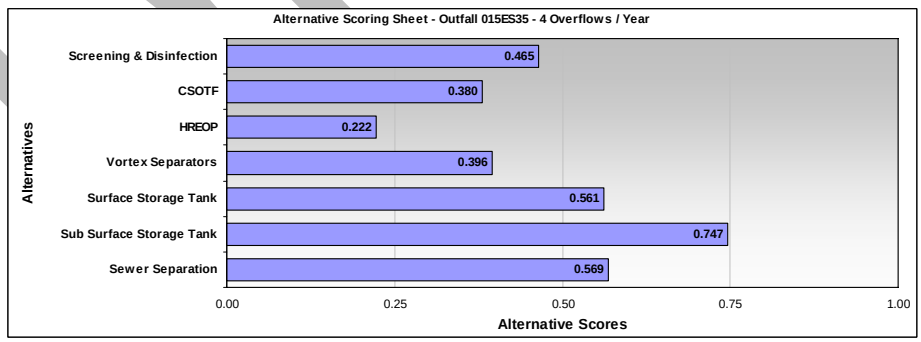
SW-D-0218.pdf

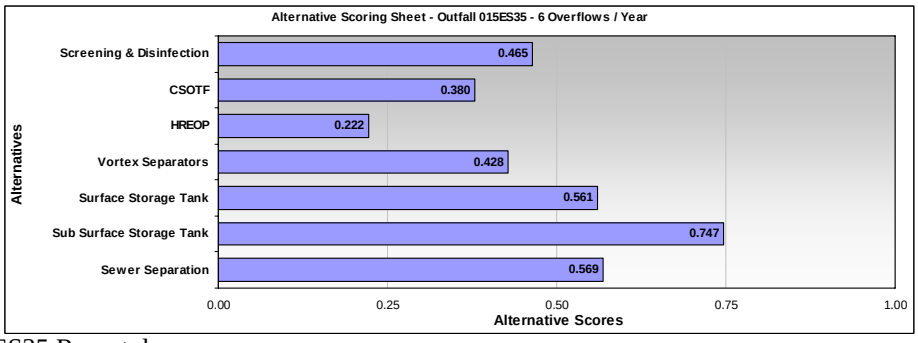
# Attachment 3 – Alternative Scoring Sheet



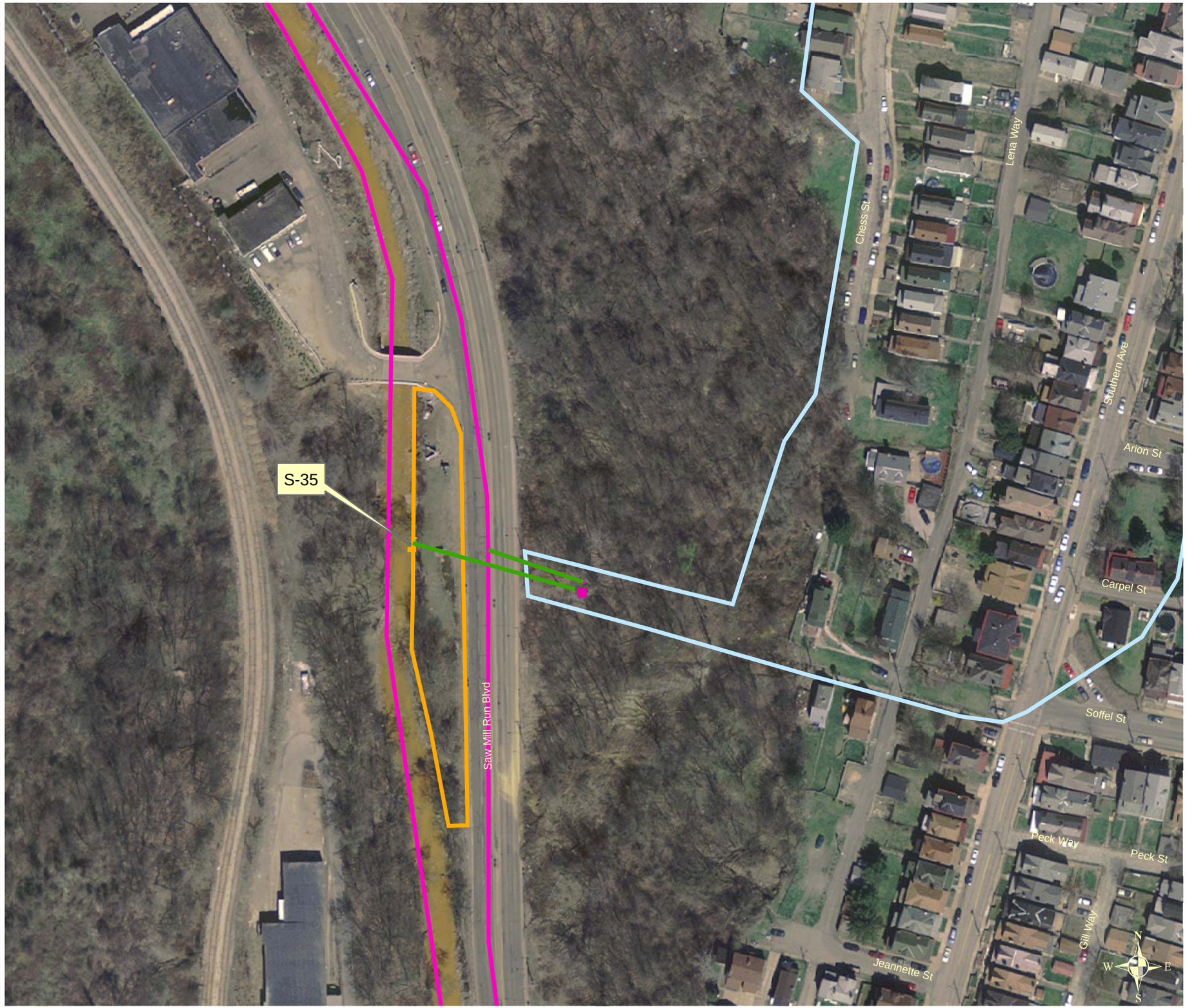



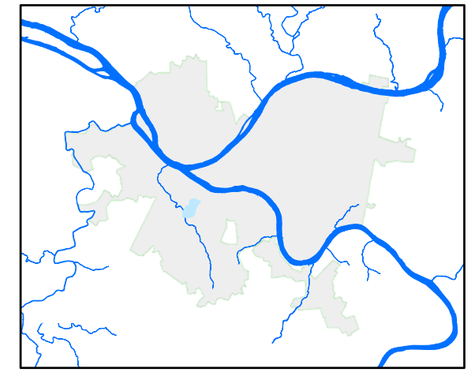





SW-D-0218.pdf



Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# S-35
# Facilities Boundary Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0218.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | | | | | |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 2 | 2 | 2 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 4 | 3 | 3 | 3 | 3 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 2 | 2 | 2 | 2 | 2 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 3 | 3 | 3 | 3 | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.795** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.779** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.600** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.568** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.588** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.588** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.588** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.327** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.222** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.316** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.348** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

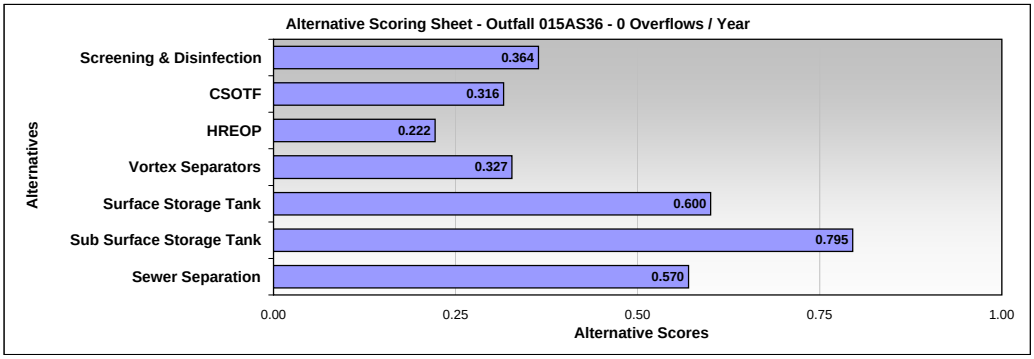
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.364** |

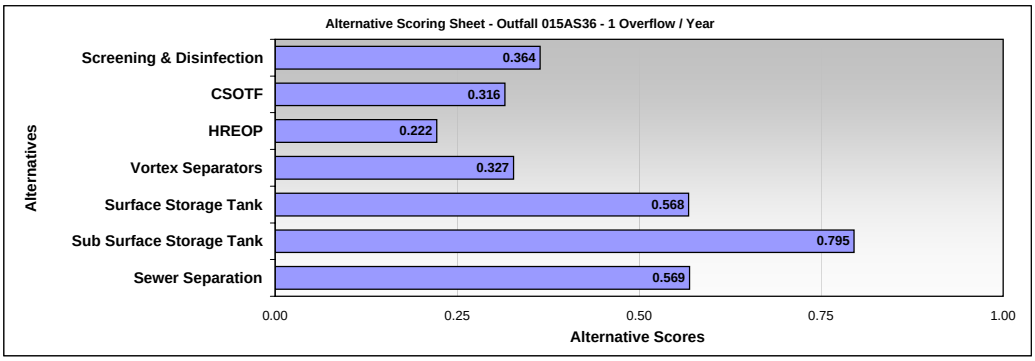
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

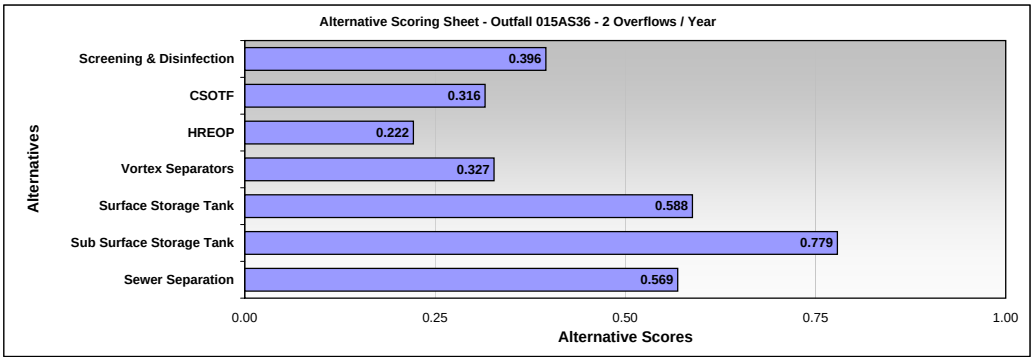
Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |

| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 2 | 0.15 | 0.062 | 0.009 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.396** |


Alternative Scoring Sheet - Outfall 015AS36 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.600
0.795
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015AS36 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.364
0.316
0.222
0.327
0.568
0.795
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015AS36 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.316
0.222
0.327
0.588
0.779
0.569
0.00
0.25
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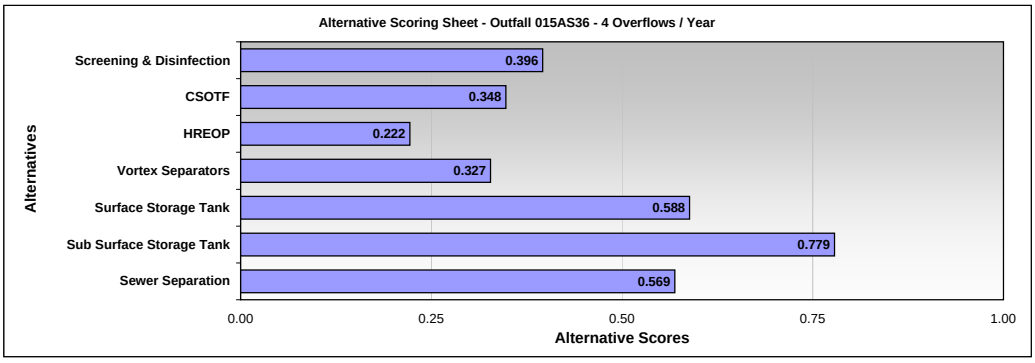
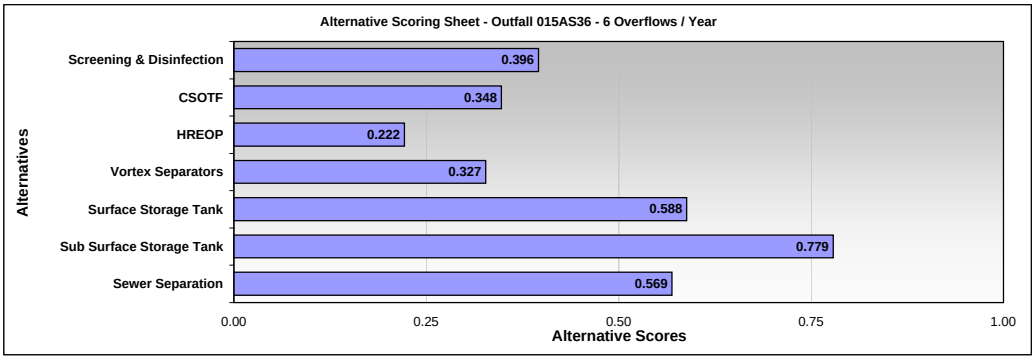
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015AS36 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.348
0.222
0.327
0.588
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 015AS36 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.396
0.348
0.222
0.327
0.588
0.779
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 37 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,550,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 16,117 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,621,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.18 | 24,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.22 | 28,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 54 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 36 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.22 | 29,160 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **148,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 11.72 | 18.13 | = Peak Rate |
| Force Main Diameter (In) | | 24 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,951,000** | **$ 32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 18.13 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 42,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 210 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **27,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 11.72 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 22,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **4,259,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.18 | 24,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.22 | 28,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 54 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 36 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.22 | 29,160 | **Sufficient Volume** |
| Tank Area (SF) | | 2,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,478,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 0.18 | 0.28 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 3 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **440,000** | **$ 14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 18.13 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 42,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **164,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 11.72 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 22,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,197,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.72 | | 18.13 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 2 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,358,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 12.89 | | 19.94 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,224,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.13 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 58,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 2,900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **211,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 11.72 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 12.89 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 57 | | 27 | |
| Passes / Detention (Min) | | 3 | | 15.44 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **605,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 12,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **24,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,772,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.72 | | 18.13 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,000 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 64 | | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 32 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.18 | | 24,576 | |
| **Construction Cost (CSOTF)** | **$** | **16,380,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 11.72 | | 18.13 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,951,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.13 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 37,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **148,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 11.72 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 11.72 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 54 | | 26 | |
| Passes / Detention (Min) | | 3 | | 15.49 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **581,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 10,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **21,169,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.72 | | 18.13 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 140 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 18 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,043,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 12.89 | | 19.94 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,224,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.13 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 11.72 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 12.89 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 57 | | 27 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.44** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 605,000 | $ | 479,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,084,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 27,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,521,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 24,491 | CF |
| | 0.18 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 18.13 | CFS |
| | 11.72 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 11.72 | | 18.13 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **955,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 11.72 | | 18.13 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,951,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.13 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 180 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **24,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 11.72 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 54 | | 26 | |
| Passes / Detention (Min) | | 3 | | **15.49** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 581,000 | $ | 454,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,035,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,147,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 37 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,550,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 16,117 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,621,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.09 | | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.11 | | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 38 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 26 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.11 | | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **69,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 7.64 | | 11.83 | = Peak Rate |
| Force Main Diameter (In) | 19 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,557,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 11.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 21,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 110 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **16,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 7.64 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **766,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,577,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.09 | | 12,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.11 | | 14,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 38 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 26 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.11 | | 14,820 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,194,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.09 | | 0.14 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **362,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 11.83 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 21,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,050 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **95,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 7.64 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **766,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,572,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.64 | | 11.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.41 | | 13.01 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 20 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,645,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.64 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **766,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 8.41 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 46 | | 22 | |
| Passes | | 3 | | **15.56** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **514,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 8,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,331,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.64 | 11.83 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,300 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 52 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 26 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.12 | 16,224 | |
| **Construction Cost (CSOTF)** | **$** | **16,385,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 7.64 | 11.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 19 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,557,000** | **$ 27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 11.83 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 24,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,200 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **106,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 7.64 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **766,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 7.64 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 44 | 21 | |
| Passes | | 3 | **15.62** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **498,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 8,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **20,457,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 7.64 | | 11.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 90 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 14 | | **OK** | Input by Engineer |
| Width (Ft) | | 7 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,400,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.41 | | 13.01 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 20 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,645,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 7.64 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **766,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 8.41 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 46 | | 22 | Input by Engineer |
| Passes | | 3 | | **15.56** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 514,000 | $ | 379,000 | |
| **Construction Cost (Disinfection)** | **$** | **893,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **6,899,000** | | | |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 12,154 | CF |
| | 0.09 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 11.83 | CFS |
| | 7.64 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 7.64 | | 11.83 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **766,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 7.64 | | 11.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 19 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,557,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 11.83 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,400 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 120 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **17,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 7.64 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 44 | | 21 | |
| Passes | | 3 | | **15.62** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 498,000 | $ | 362,000 | |
| **Construction Cost (Disinfection)** | **$** | **860,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,375,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 37 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,550,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 16,117 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,621,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.08 | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.10 | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 37 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 25 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.10 | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **63,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 4.70 | 7.27 | = Peak Rate |
| Force Main Diameter (In) | | 15 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,158,000** | **$ 24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.27 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 20,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 100 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 4.70 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **630,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **3,032,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.08 | | 11,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.10 | | 13,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 37 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 25 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.10 | | 13,875 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,173,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.08 | | 0.13 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **356,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 7.27 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 20,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **92,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 4.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **630,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,406,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.70 | | 7.27 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.17 | | 8.00 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,228,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.27 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **630,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 5.17 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | | 18 | |
| Passes | | 3 | | **16.20** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **447,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 5,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **10,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,702,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.70 | 7.27 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 800 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 41 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 21 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.08 | 10,332 | |
| **Construction Cost (CSOTF)** | **$** | **16,390,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 4.70 | 7.27 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,158,000** | **$ 24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 7.27 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 15,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 750 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **73,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 4.70 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **630,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 4.70 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | 17 | |
| Passes | | 3 | **16.36** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **437,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 7,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **19,828,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 4.70 | | 7.27 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 60 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 12 | | **OK** | Input by Engineer |
| Width (Ft) | | 6 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,937,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 5.17 | | 8.00 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 16 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,228,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.27 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 4.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **630,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 5.17 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 36 | | 18 | Input by Engineer |
| Passes | | 3 | | **16.20** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 447,000 | $ | 301,000 | |
| **Construction Cost (Disinfection)** | **$** | **748,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 24,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,733,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 11,240 | CF |
| | 0.08 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 7.27 | CFS |
| | 4.70 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 4.70 | | 7.27 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **630,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 4.70 | | 7.27 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 15 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,158,000** | **$** | **24,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 7.27 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 80 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **13,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 4.70 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 35 | | 17 | |
| Passes | | 3 | | **16.36** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 437,000 | $ | 291,000 | |
| **Construction Cost (Disinfection)** | **$** | **728,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,701,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 37 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,550,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 16,117 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,621,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 0.05 | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 0.06 | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 29 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 20 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 0.07 | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | | 1,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **37,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 3.03 | 4.68 | = Peak Rate |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,889,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.68 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 60 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **10,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 3.03 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **552,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 20,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **40,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **2,651,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.05 | | 7,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.06 | | 8,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 29 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 20 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.07 | | 8,700 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,072,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.05 | | 0.08 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 3.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **328,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.68 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 12,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **61,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 3.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **552,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,168,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.03 | | 4.68 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.33 | | 5.15 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,940,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.68 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **552,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **15.76** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **408,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,290,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.03 | | 4.68 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 600 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 36 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 18 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.06 | | 7,776 | |
| **Construction Cost (CSOTF)** | **$** | **16,393,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.03 | | 4.68 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,889,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.68 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 3.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **552,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.03 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 28 | | 14 | |
| Passes | | 3 | | **16.74** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **402,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **19,432,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 3.03 | | 4.68 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,674,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.33 | | 5.15 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,940,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.68 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 3.03 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **552,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | Input by Engineer |
| Passes | | 3 | | **15.76** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 408,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **654,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **4,999,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 6,833 | CF |
| | 0.05 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.68 | CFS |
| | 3.03 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 3.03 | | 4.68 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **552,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 3.03 | | 4.68 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,889,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.68 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 3.03 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 28 | | 14 | |
| Passes | | 3 | | **16.74** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 402,000 | $ | 241,000 | |
| **Construction Cost (Disinfection)** | **$** | **643,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,262,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 37 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **5,550,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 16,117 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **32,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,621,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **31,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 2.89 | | 4.47 | = Peak Rate |
| Force Main Diameter (In) | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,866,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.47 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 60 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **10,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 2.89 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **546,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,616,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.04 | | 6,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.05 | | 7,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 27 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 19 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.06 | | 7,695 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,047,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.04 | | 0.07 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 1 | | | Input by Engineer |
| Force Main Velocity (FPS) | 12.2 | | **Check:** | **Not OK** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **321,000** | **$** | **12,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 4.47 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 11,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 550 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **57,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 2.89 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **546,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 20,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **40,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,125,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.89 | | 4.47 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.18 | | 4.92 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,915,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.47 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.89 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **546,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 3.18 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | |
| Passes | | 3 | | **16.52** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **405,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 3,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **6,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **3,255,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.89 | 4.47 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 33 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 16 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.05 | 6,336 | |
| **Construction Cost (CSOTF)** | **$** | **16,394,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 2.89 | 4.47 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.7 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,866,000** | **$ 21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 4.47 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 10,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 500 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **53,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 2.89 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **546,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 2.89 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | 13 | |
| Passes | | 3 | **15.71** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **399,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 6,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **12,000** | | |
| **TOTAL CAPITAL COST** | **$** | **19,393,000** | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 2.89 | | 4.47 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 40 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 10 | | **OK** | Input by Engineer |
| Width (Ft) | | 5 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **1,653,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 3.18 | | 4.92 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 12 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,915,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.47 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 1,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 2.89 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **546,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 3.18 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 29 | | 14 | Input by Engineer |
| Passes | | 3 | | **16.52** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 405,000 | $ | 246,000 | |
| **Construction Cost (Disinfection)** | **$** | **651,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 23,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,943,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 37 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 5,763 | CF |
| | 0.04 | MG |
| Total Volume | 111,969 | CF |
| | 0.84 | MG |
| Peak Rate | 4.47 | CFS |
| | 2.89 | MGD |

| Capital Costs - 015AS36 / Sewershed ACSO 015AS36 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 2.89 | | 4.47 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **546,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 2.89 | | 4.47 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 12 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,866,000** | **$** | **21,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 4.47 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 50 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **9,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 2.89 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 27 | | 13 | |
| Passes | | 3 | | **15.71** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 399,000 | $ | 232,000 | |
| **Construction Cost (Disinfection)** | **$** | **631,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **3,221,000** | | | |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 11.72 | $97,305 | 20 | 10.910 | $1,061,586 |
| | Tank O&M | No. Events / Yr | 37 | $23,103 | 50 | 14.484 | $334,612 |
| | | Const Cost ($) | $148,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,432 | 20 | 10.910 | $91,990 |
| | Odor Control O&M | Capacity (cfm) | 210 | $735 | 20 | 10.910 | $8,019 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,711 |
| | | | **Total Annual O&M** | **$130,000** | | **Total PW O&M** | **$1,511,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.18 | $6,048 | 20 | 10.910 | $65,988 |
| | Tank O&M | No. Events / Yr | 37 | $26,428 | 50 | 14.484 | $382,769 |
| | | Const Cost ($) | $1,478,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,432 | 20 | 10.910 | $91,990 |
| | Odor Control O&M | Capacity (cfm) | 2,100 | $7,350 | 20 | 10.910 | $80,188 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,839 |
| | | | **Total Annual O&M** | **$49,000** | | **Total PW O&M** | **$626,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 11.72 | $97,305 | 20 | 10.910 | $1,061,586 |
| | Sed. Basin O&M | Flow Rate (mgd) | 11.72 | $1,318 | 50 | 14.484 | $19,090 |
| | Screening O&M | Flow Rate (mgd) | 11.72 | $8,432 | 20 | 10.910 | $91,990 |
| | Disinfection O&M | Flow Rate (mgd) | 11.72 | $72,008 | 20 | 10.910 | $785,602 |
| | Odor Control O&M | Capacity (cfm) | 1,850.00 | $6,475 | 20 | 10.910 | $70,642 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,621 |
| | | | **Total Annual O&M** | **$186,000** | | **Total PW O&M** | **$2,046,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 12.89 | $103,702 | 20 | 10.910 | $1,131,383 |
| | HREP O&M | Flow Rate (mgd) | 11.72 | $99,026 | 20 | 10.910 | $1,080,369 |
| | Screening O&M | Flow Rate (mgd) | 11.72 | $8,432 | 20 | 10.910 | $91,990 |
| | Disinfection O&M | Flow Rate (mgd) | 12.89 | $76,313 | 20 | 10.910 | $832,566 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,745 |
| | | | **Total Annual O&M** | **$289,000** | | **Total PW O&M** | **$3,170,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 12.89 | $103,702 | 20 | 10.910 | $1,131,383 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 11.72 | $1,318 | 20 | 10.910 | $14,379 |
| | Screening O&M | Flow Rate (mgd) | 11.72 | $8,432 | 20 | 10.910 | $91,990 |
| | Disinfection O&M | Flow Rate (mgd) | 12.89 | $76,313 | 20 | 10.910 | $832,566 |
| | Odor Control O&M | Capacity (cfm) | 2,900.00 | $10,150 | 20 | 10.910 | $110,736 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,818 |
| | | | **Total Annual O&M** | **$200,000** | | **Total PW O&M** | **$2,201,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 11.72 | $97,305 | 20 | 10.910 | $1,061,586 |
| | Screening O&M | Flow Rate (mgd) | 11.72 | $8,432 | 20 | 10.910 | $91,990 |
| | Disinfection O&M | Flow Rate (mgd) | 11.72 | $72,008 | 20 | 10.910 | $785,602 |
| | Odor Control O&M | Capacity (cfm) | 180.00 | $630 | 20 | 10.910 | $6,873 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,283 |
| | | | **Total Annual O&M** | **$179,000** | | **Total PW O&M** | **$1,962,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 7.64 | $73,155 | 20 | 10.910 | $798,121 |
| | Tank O&M | No. Events / Yr | 37 | $22,905 | 50 | 14.484 | $331,751 |
| | | Const Cost ($) | $69,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 8 | $8,080 | 20 | 10.910 | $88,151 |
| | Odor Control O&M | Capacity (cfm) | 110 | $385 | 20 | 10.910 | $4,200 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,560 |
| | | | **Total Annual O&M** | **$105,000** | | **Total PW O&M** | **$1,235,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.09 | $3,788 | 20 | 10.910 | $41,322 |
| | Tank O&M | No. Events / Yr | 37 | $25,718 | 50 | 14.484 | $372,486 |
| | | Const Cost ($) | $1,194,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 8 | $8,080 | 20 | 10.910 | $88,151 |
| | Odor Control O&M | Capacity (cfm) | 1,050 | $3,675 | 20 | 10.910 | $40,094 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,819 |
| | | | **Total Annual O&M** | **$42,000** | | **Total PW O&M** | **$546,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 7.64 | $73,155 | 20 | 10.910 | $798,121 |
| | Sed. Basin O&M | Flow Rate (mgd) | 7.64 | $860 | 50 | 14.484 | $12,456 |
| | Screening O&M | Flow Rate (mgd) | 7.64 | $8,080 | 20 | 10.910 | $88,151 |
| | Disinfection O&M | Flow Rate (mgd) | 7.64 | $55,516 | 20 | 10.910 | $605,672 |
| | Odor Control O&M | Capacity (cfm) | 1,200.00 | $4,200 | 20 | 10.910 | $45,822 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,159 |
| | | | **Total Annual O&M** | **$142,000** | | **Total PW O&M** | **$1,564,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 8.41 | $77,965 | 20 | 10.910 | $850,596 |
| | HREP O&M | Flow Rate (mgd) | 7.64 | $77,037 | 20 | 10.910 | $840,465 |
| | Screening O&M | Flow Rate (mgd) | 7.64 | $8,080 | 20 | 10.910 | $88,151 |
| | Disinfection O&M | Flow Rate (mgd) | 8.41 | $58,834 | 20 | 10.910 | $641,880 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $20,842 |
| | | | **Total Annual O&M** | **$223,000** | | **Total PW O&M** | **$2,446,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 8.41 | $77,965 | 20 | 10.910 | $850,596 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 7.64 | $860 | 20 | 10.910 | $9,382 |
| | Screening O&M | Flow Rate (mgd) | 7.64 | $8,080 | 20 | 10.910 | $88,151 |
| | Disinfection O&M | Flow Rate (mgd) | 8.41 | $58,834 | 20 | 10.910 | $641,880 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,273 |
| | | | **Total Annual O&M** | **$146,000** | | **Total PW O&M** | **$1,604,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 7.64 | $73,155 | 20 | 10.910 | $798,121 |
| | Screening O&M | Flow Rate (mgd) | 7.64 | $8,080 | 20 | 10.910 | $88,151 |
| | Disinfection O&M | Flow Rate (mgd) | 7.64 | $55,516 | 20 | 10.910 | $605,672 |
| | Odor Control O&M | Capacity (cfm) | 120.00 | $420 | 20 | 10.910 | $4,582 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,917 |
| | | | **Total Annual O&M** | **$138,000** | | **Total PW O&M** | **$1,510,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 4.70 | $52,863 | 20 | 10.910 | $576,729 |
| | Tank O&M | No. Events / Yr | 37 | $22,890 | 50 | 14.484 | $331,534 |
| | | Const Cost ($) | $63,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,829 | 20 | 10.910 | $85,416 |
| | Odor Control O&M | Capacity (cfm) | 100 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,559 |
| | | | **Total Annual O&M** | **$84,000** | | **Total PW O&M** | **$1,008,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.08 | $3,595 | 20 | 10.910 | $39,218 |
| | Tank O&M | No. Events / Yr | 37 | $25,665 | 50 | 14.484 | $371,726 |
| | | Const Cost ($) | $1,173,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 5 | $7,829 | 20 | 10.910 | $85,416 |
| | Odor Control O&M | Capacity (cfm) | 1,000 | $3,500 | 20 | 10.910 | $38,185 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,416 |
| | | | **Total Annual O&M** | **$41,000** | | **Total PW O&M** | **$538,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 4.70 | $52,863 | 20 | 10.910 | $576,729 |
| | Sed. Basin O&M | Flow Rate (mgd) | 4.70 | $529 | 50 | 14.484 | $7,659 |
| | Screening O&M | Flow Rate (mgd) | 4.70 | $7,829 | 20 | 10.910 | $85,416 |
| | Disinfection O&M | Flow Rate (mgd) | 4.70 | $41,282 | 20 | 10.910 | $450,381 |
| | Odor Control O&M | Capacity (cfm) | 750.00 | $2,625 | 20 | 10.910 | $28,639 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,905 |
| | | | **Total Annual O&M** | **$106,000** | | **Total PW O&M** | **$1,161,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 5.17 | $56,338 | 20 | 10.910 | $614,648 |
| | HREP O&M | Flow Rate (mgd) | 4.70 | $57,876 | 20 | 10.910 | $631,420 |
| | Screening O&M | Flow Rate (mgd) | 4.70 | $7,829 | 20 | 10.910 | $85,416 |
| | Disinfection O&M | Flow Rate (mgd) | 5.17 | $43,750 | 20 | 10.910 | $477,305 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,329 |
| | | | **Total Annual O&M** | **$167,000** | | **Total PW O&M** | **$1,830,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 5.17 | $56,338 | 20 | 10.910 | $614,648 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 4.70 | $529 | 20 | 10.910 | $5,769 |
| | Screening O&M | Flow Rate (mgd) | 4.70 | $7,829 | 20 | 10.910 | $85,416 |
| | Disinfection O&M | Flow Rate (mgd) | 5.17 | $43,750 | 20 | 10.910 | $477,305 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,020 |
| | | | **Total Annual O&M** | **$109,000** | | **Total PW O&M** | **$1,195,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 4.70 | $52,863 | 20 | 10.910 | $576,729 |
| | Screening O&M | Flow Rate (mgd) | 4.70 | $7,829 | 20 | 10.910 | $85,416 |
| | Disinfection O&M | Flow Rate (mgd) | 4.70 | $41,282 | 20 | 10.910 | $450,381 |
| | Odor Control O&M | Capacity (cfm) | 80.00 | $280 | 20 | 10.910 | $3,055 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,742 |
| | | | **Total Annual O&M** | **$103,000** | | **Total PW O&M** | **$1,127,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.03 | $39,396 | 20 | 10.910 | $429,807 |
| | Tank O&M | No. Events / Yr | 37 | $22,825 | 50 | 14.484 | $330,592 |
| | | Const Cost ($) | $37,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,688 | 20 | 10.910 | $83,877 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,236 |
| | | | **Total Annual O&M** | **$71,000** | | **Total PW O&M** | **$856,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.05 | $2,578 | 20 | 10.910 | $28,124 |
| | Tank O&M | No. Events / Yr | 37 | $25,413 | 50 | 14.484 | $368,069 |
| | | Const Cost ($) | $1,072,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,688 | 20 | 10.910 | $83,877 |
| | Odor Control O&M | Capacity (cfm) | 600 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,006 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$506,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 3.03 | $39,396 | 20 | 10.910 | $429,807 |
| | Sed. Basin O&M | Flow Rate (mgd) | 3.03 | $341 | 50 | 14.484 | $4,932 |
| | Screening O&M | Flow Rate (mgd) | 3.03 | $7,688 | 20 | 10.910 | $83,877 |
| | Disinfection O&M | Flow Rate (mgd) | 3.03 | $31,573 | 20 | 10.910 | $344,460 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,468 |
| | | | **Total Annual O&M** | **$82,000** | | **Total PW O&M** | **$896,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.33 | $41,986 | 20 | 10.910 | $458,066 |
| | HREP O&M | Flow Rate (mgd) | 3.03 | $44,677 | 20 | 10.910 | $487,428 |
| | Screening O&M | Flow Rate (mgd) | 3.03 | $7,688 | 20 | 10.910 | $83,877 |
| | Disinfection O&M | Flow Rate (mgd) | 3.33 | $33,461 | 20 | 10.910 | $365,053 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,104 |
| | | | **Total Annual O&M** | **$128,000** | | **Total PW O&M** | **$1,411,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.33 | $41,986 | 20 | 10.910 | $458,066 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 3.03 | $341 | 20 | 10.910 | $3,715 |
| | Screening O&M | Flow Rate (mgd) | 3.03 | $7,688 | 20 | 10.910 | $83,877 |
| | Disinfection O&M | Flow Rate (mgd) | 3.33 | $33,461 | 20 | 10.910 | $365,053 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,526 |
| | | | **Total Annual O&M** | **$84,000** | | **Total PW O&M** | **$921,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 3.03 | $39,396 | 20 | 10.910 | $429,807 |
| | Screening O&M | Flow Rate (mgd) | 3.03 | $7,688 | 20 | 10.910 | $83,877 |
| | Disinfection O&M | Flow Rate (mgd) | 3.03 | $31,573 | 20 | 10.910 | $344,460 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,326 |
| | | | **Total Annual O&M** | **$79,000** | | **Total PW O&M** | **$870,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 2.89 | $38,177 | 20 | 10.910 | $416,513 |
| | Tank O&M | No. Events / Yr | 37 | $22,810 | 50 | 14.484 | $330,375 |
| | | Const Cost ($) | $31,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,676 | 20 | 10.910 | $83,749 |
| | Odor Control O&M | Capacity (cfm) | 60 | $210 | 20 | 10.910 | $2,291 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,126 |
| | | | **Total Annual O&M** | **$69,000** | | **Total PW O&M** | **$842,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.04 | $2,301 | 20 | 10.910 | $25,100 |
| | Tank O&M | No. Events / Yr | 37 | $25,350 | 50 | 14.484 | $367,163 |
| | | Const Cost ($) | $1,047,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 3 | $7,676 | 20 | 10.910 | $83,749 |
| | Odor Control O&M | Capacity (cfm) | 550 | $1,925 | 20 | 10.910 | $21,002 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $2,950 |
| | | | **Total Annual O&M** | **$38,000** | | **Total PW O&M** | **$500,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 2.89 | $38,177 | 20 | 10.910 | $416,513 |
| | Sed. Basin O&M | Flow Rate (mgd) | 2.89 | $325 | 50 | 14.484 | $4,706 |
| | Screening O&M | Flow Rate (mgd) | 2.89 | $7,676 | 20 | 10.910 | $83,749 |
| | Disinfection O&M | Flow Rate (mgd) | 2.89 | $30,681 | 20 | 10.910 | $334,732 |
| | Odor Control O&M | Capacity (cfm) | 500.00 | $1,750 | 20 | 10.910 | $19,092 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,328 |
| | | | **Total Annual O&M** | **$79,000** | | **Total PW O&M** | **$869,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 3.18 | $40,687 | 20 | 10.910 | $443,898 |
| | HREP O&M | Flow Rate (mgd) | 2.89 | $43,459 | 20 | 10.910 | $474,132 |
| | Screening O&M | Flow Rate (mgd) | 2.89 | $7,676 | 20 | 10.910 | $83,749 |
| | Disinfection O&M | Flow Rate (mgd) | 3.18 | $32,516 | 20 | 10.910 | $354,743 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,921 |
| | | | **Total Annual O&M** | **$125,000** | | **Total PW O&M** | **$1,373,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 3.18 | $40,687 | 20 | 10.910 | $443,898 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 2.89 | $325 | 20 | 10.910 | $3,545 |
| | Screening O&M | Flow Rate (mgd) | 2.89 | $7,676 | 20 | 10.910 | $83,749 |
| | Disinfection O&M | Flow Rate (mgd) | 3.18 | $32,516 | 20 | 10.910 | $354,743 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,400 |
| | | | **Total Annual O&M** | **$82,000** | | **Total PW O&M** | **$896,000** |

| ACSO 015AS36 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 2.89 | $38,177 | 20 | 10.910 | $416,513 |
| | Screening O&M | Flow Rate (mgd) | 2.89 | $7,676 | 20 | 10.910 | $83,749 |
| | Disinfection O&M | Flow Rate (mgd) | 2.89 | $30,681 | 20 | 10.910 | $334,732 |
| | Odor Control O&M | Capacity (cfm) | 50.00 | $175 | 20 | 10.910 | $1,909 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,208 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$847,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.6 | $5,621,000 | $0 |
| 1 | $5.6 | $5,621,000 | $0 |
| 2 | $5.6 | $5,621,000 | $0 |
| 4 | $5.6 | $5,621,000 | $0 |
| 6 | $5.6 | $5,621,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $3.8 | $3,197,000 | $626,000 |
| 1 | $3.1 | $2,572,000 | $546,000 |
| 2 | $2.9 | $2,406,000 | $538,000 |
| 4 | $2.7 | $2,168,000 | $506,000 |
| 6 | $2.6 | $2,125,000 | $500,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $5.8 | $4,259,000 | $1,511,000 |
| 1 | $4.8 | $3,577,000 | $1,235,000 |
| 2 | $4.0 | $3,032,000 | $1,008,000 |
| 4 | $3.5 | $2,651,000 | $856,000 |
| 6 | $3.5 | $2,616,000 | $842,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $9.0 | $6,772,000 | $2,201,000 |
| 1 | $5.9 | $4,331,000 | $1,604,000 |
| 2 | $4.9 | $3,702,000 | $1,195,000 |
| 4 | $4.2 | $3,290,000 | $921,000 |
| 6 | $4.2 | $3,255,000 | $896,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $11.7 | $8,521,000 | $3,170,000 |
| 1 | $9.3 | $6,899,000 | $2,446,000 |
| 2 | $7.6 | $5,733,000 | $1,830,000 |
| 4 | $6.4 | $4,999,000 | $1,411,000 |
| 6 | $6.3 | $4,943,000 | $1,373,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $23.2 | $21,169,000 | $2,046,000 |
| 1 | $22.0 | $20,457,000 | $1,564,000 |
| 2 | $21.0 | $19,828,000 | $1,161,000 |
| 4 | $20.3 | $19,432,000 | $896,000 |
| 6 | $20.3 | $19,393,000 | $869,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $7.1 | $5,147,000 | $1,962,000 |
| 1 | $5.9 | $4,375,000 | $1,510,000 |
| 2 | $4.8 | $3,701,000 | $1,127,000 |
| 4 | $4.1 | $3,262,000 | $870,000 |
| 6 | $4.1 | $3,221,000 | $847,000 |

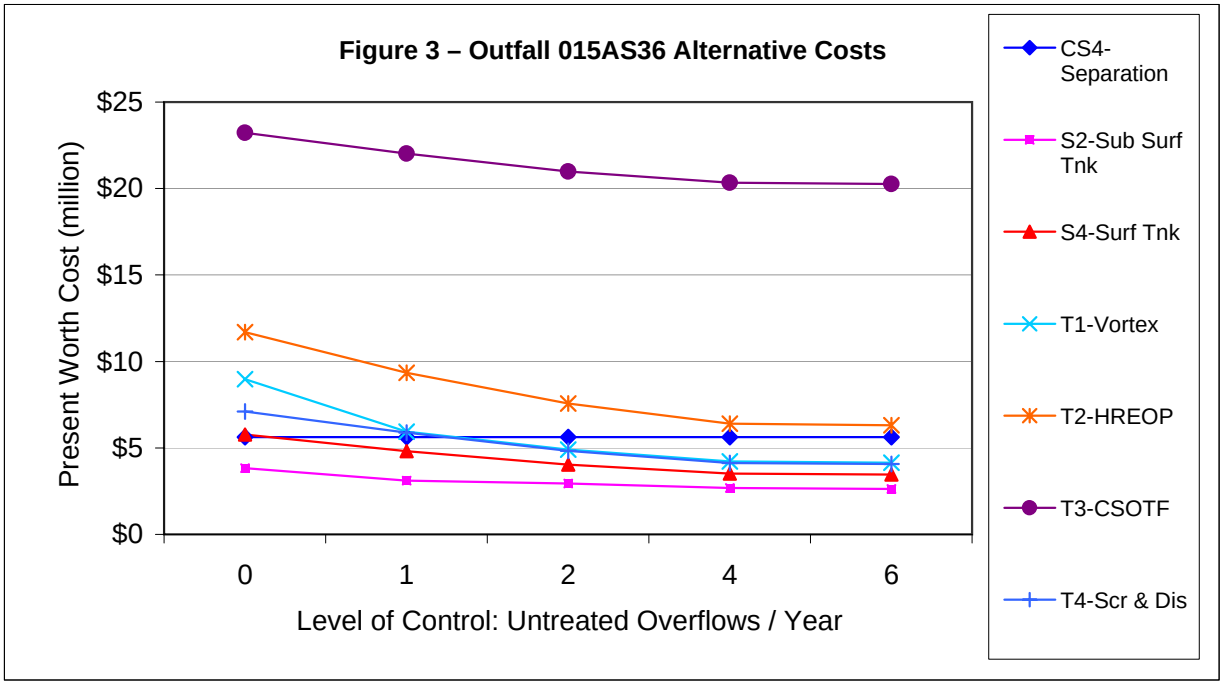


Figure 3 – Outfall 015AS36 Alternative Costs
Present Worth Cost (million)
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015AS36 |
| **Location Name** | S-36 |
| **Model ID** | ADC 015AS36.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015AS36 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 37 |
| Peak Volume: | 24,491 $ft^3$ |
| | 0.18 MG |
| Total Volume: | 111,969 $ft^3$ |
| | 0.84 MG |
| Peak Rate: | 18.13 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:15 | 65 | 8/20/2005 18:30 | 24491.36 | 183.208 | 0 | 18.13 | 0 |
| 7/26/2005 19:45 | 40 | 7/26/2005 20:00 | 12154.47 | 90.921 | 1 | 11.83 | 1 |
| 5/13/2005 22:30 | 103 | 5/13/2005 22:45 | 11239.97 | 84.081 | 2 | 7.27 | 2 |
| 7/5/2005 16:20 | 59 | 7/5/2005 17:00 | 8533.34 | 63.834 | 3 | 4.68 | 4 |
| 7/15/2005 17:35 | 49 | 7/15/2005 18:00 | 6833.36 | 51.117 | 4 | 4.47 | 6 |
| 4/23/2005 3:45 | 54 | 4/23/2005 4:00 | 6258.09 | 46.814 | 5 | 4.36 | 7 |
| 1/5/2005 13:45 | 1263 | 1/5/2005 14:45 | 5763.40 | 43.113 | 6 | 1.28 | 17 |
| 8/29/2005 13:30 | 25 | 8/29/2005 13:45 | 3679.17 | 27.522 | 7 | 4.90 | 3 |
| 7/21/2005 14:30 | 25 | 7/21/2005 14:45 | 3396.99 | 25.411 | 8 | 4.27 | 8 |
| 9/29/2005 5:30 | 29 | 9/29/2005 5:45 | 3306.56 | 24.735 | 9 | 4.50 | 5 |
| 11/9/2005 19:30 | 25 | 11/9/2005 19:45 | 2969.31 | 22.212 | 10 | 3.92 | 9 |
| 11/29/2005 6:50 | 284 | 11/29/2005 7:15 | 2665.40 | 19.938 | 11 | 0.96 | 22 |
| 11/14/2005 22:11 | 353 | 11/14/2005 23:00 | 2563.25 | 19.174 | 12 | 1.08 | 21 |
| 5/23/2005 16:20 | 31 | 5/23/2005 16:30 | 2065.59 | 15.452 | 13 | 2.05 | 12 |
| 8/27/2005 15:20 | 24 | 8/27/2005 15:30 | 1725.55 | 12.908 | 14 | 2.98 | 10 |
| 5/11/2005 22:45 | 80 | 5/11/2005 23:00 | 1561.46 | 11.680 | 15 | 1.51 | 16 |
| 1/8/2005 5:01 | 49 | 1/8/2005 5:15 | 1556.68 | 11.645 | 16 | 0.81 | 23 |
| 2/9/2005 16:30 | 25 | 2/9/2005 16:45 | 1406.77 | 10.523 | 17 | 1.87 | 14 |
| 5/14/2005 16:06 | 57 | 5/14/2005 16:15 | 1359.57 | 10.170 | 18 | 1.27 | 18 |
| 1/12/2005 1:05 | 34 | 1/12/2005 1:30 | 1235.97 | 9.246 | 19 | 1.09 | 20 |
| 7/25/2005 13:20 | 20 | 7/25/2005 13:30 | 1054.74 | 7.890 | 20 | 2.18 | 11 |
| 9/16/2005 21:35 | 19 | 9/16/2005 21:45 | 958.65 | 7.171 | 21 | 1.95 | 13 |
| 11/9/2005 4:20 | 19 | 11/9/2005 4:30 | 881.89 | 6.597 | 22 | 1.78 | 15 |
| 7/12/2005 19:50 | 20 | 7/12/2005 20:00 | 709.36 | 5.306 | 23 | 1.13 | 19 |
| 2/20/2005 19:55 | 42 | 2/20/2005 20:30 | 563.61 | 4.216 | 24 | 0.55 | 25 |
| 5/28/2005 8:56 | 38 | 5/28/2005 9:20 | 478.88 | 3.582 | 25 | 0.27 | 33 |
| 10/22/2005 6:40 | 24 | 10/22/2005 7:00 | 450.53 | 3.370 | 26 | 0.52 | 26 |
| 3/28/2005 18:55 | 24 | 3/28/2005 19:00 | 426.03 | 3.187 | 27 | 0.38 | 30 |
| 1/11/2005 11:20 | 23 | 1/11/2005 11:30 | 417.05 | 3.120 | 28 | 0.63 | 24 |
| 10/7/2005 10:35 | 24 | 10/7/2005 10:45 | 288.64 | 2.159 | 29 | 0.40 | 28 |
| 1/14/2005 2:05 | 17 | 1/14/2005 2:15 | 230.86 | 1.727 | 30 | 0.42 | 27 |
| 3/28/2005 9:58 | 22 | 3/28/2005 10:15 | 201.29 | 1.506 | 31 | 0.26 | 35 |
| 4/2/2005 6:23 | 26 | 4/2/2005 6:45 | 145.60 | 1.089 | 32 | 0.12 | 36 |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 7/17/2005 16:40 | 10 | 7/17/2005 16:45 | 119.33 | 0.893 | 33 | 0.38 | 29 |
| 12/15/2005 13:51 | 13 | 12/15/2005 14:00 | 109.52 | 0.819 | 34 | 0.28 | 32 |
| 6/11/2005 17:55 | 9 | 6/11/2005 18:00 | 88.86 | 0.665 | 35 | 0.30 | 31 |
| 6/28/2005 18:10 | 9 | 6/28/2005 18:15 | 77.73 | 0.581 | 36 | 0.26 | 34 |

SW-D-0219.pdf
ACSO 015A336.1

# Region 1

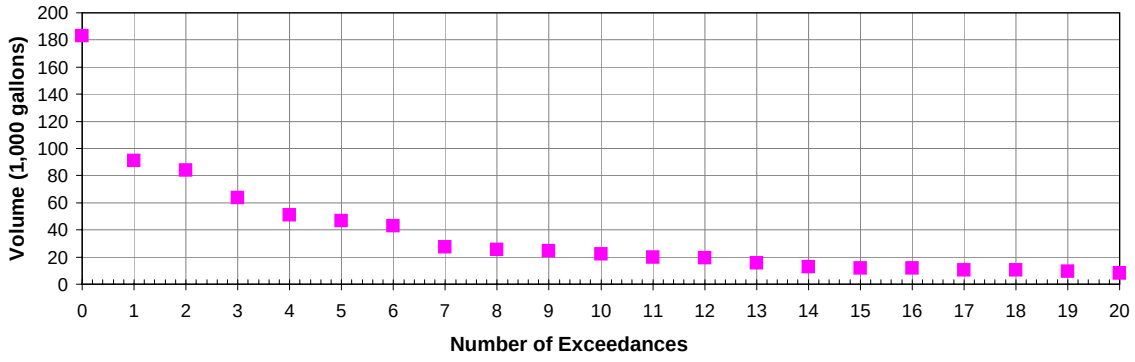
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 015AS36 |
| **Location Name** | S-36 |
| **Model ID** | ADC 015AS36.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Saw Mill Run Interceptor (O-14) |
| **Stream of Discharge** | Ohio River |
| **NPDES Permit Number** | 015AS36 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

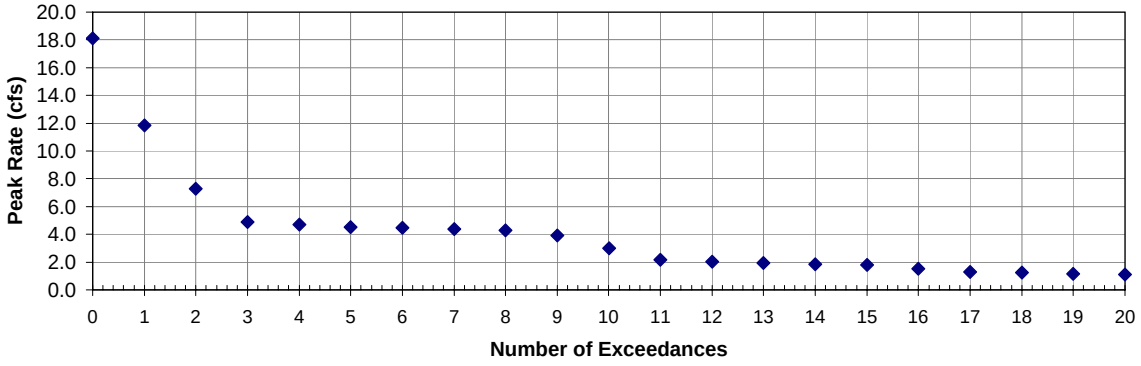
**Results Summary**

| | |
|---|---|
| Number of Events: | 37 |
| Peak Volume: | 24,491 $ft^3$ |
| | 0.18 MG |
| Total Volume: | 111,969 $ft^3$ |
| | 0.84 MG |
| Peak Rate: | 18.13 cfs |

### Figure 1 - Outfall 015AS36 CSO Volume




### Figure 2 - Outfall 015AS36 CSO Peak Flow Rate



## D.26.8 0-14 – SAW MILL RUN INTERCEPTOR SEWERSHED – S-36 – NPDES# 015AS36

### Description of Outfall

Outfall 015AS36 conveys overflows from ALCOSAN diversion chamber S-36 to Saw Mill Run, and ultimately into the Ohio River. The Saw Mill Run Interceptor Sewersheds are located in portions of Beechview, Beltzhoover, Bon Air, Brookline, Carrick, Duquesne Heights, Elliott, Mount Washington, Ridgemont, South Shore, West End sections in the City of Pittsburgh and Baldwin Township, the Municipality of Bethel Park, Castle Shannon Borough, the Municipality of Mount Lebanon and Whitehall Borough. The outfall is located along Saw Mill Run, near Saw Mill Run Boulevard. The Saw Mill Run Interceptor sewersheds include approximately 4,734 acres of residential, business and commercial users. The 015AS36 Sewershed (S-36) consists of 37 acres, or approximately 0.80% of the total service area. The Sawmill Run Interceptor Sewersheds are comprised of approximately 1,587 manholes and 353,993 linear feet (67.0 miles) of combined, sanitary, and storm sewer up to 72 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 015AS36 typically experiences 37 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 015AS36 is approximately 0.18 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 015AS36 is approximately 18.13 CFS. *Figure 1 – Outfall 015AS36 CSO Volume* and *Figure 2 – Outfall 015AS36 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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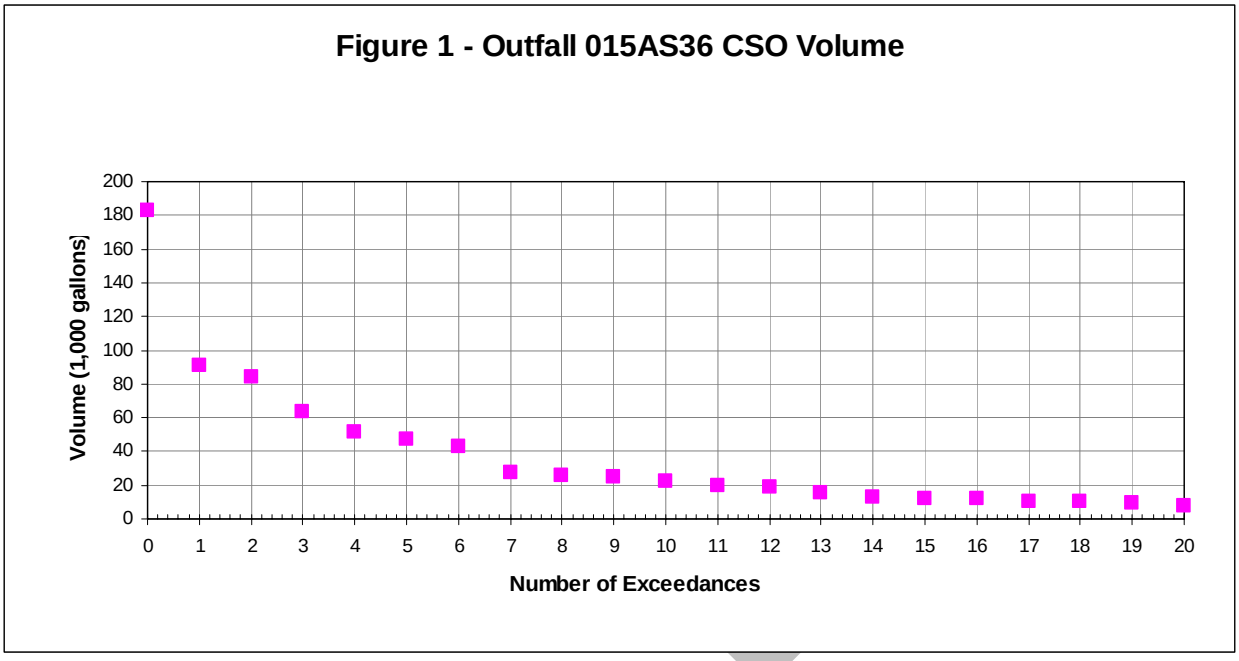


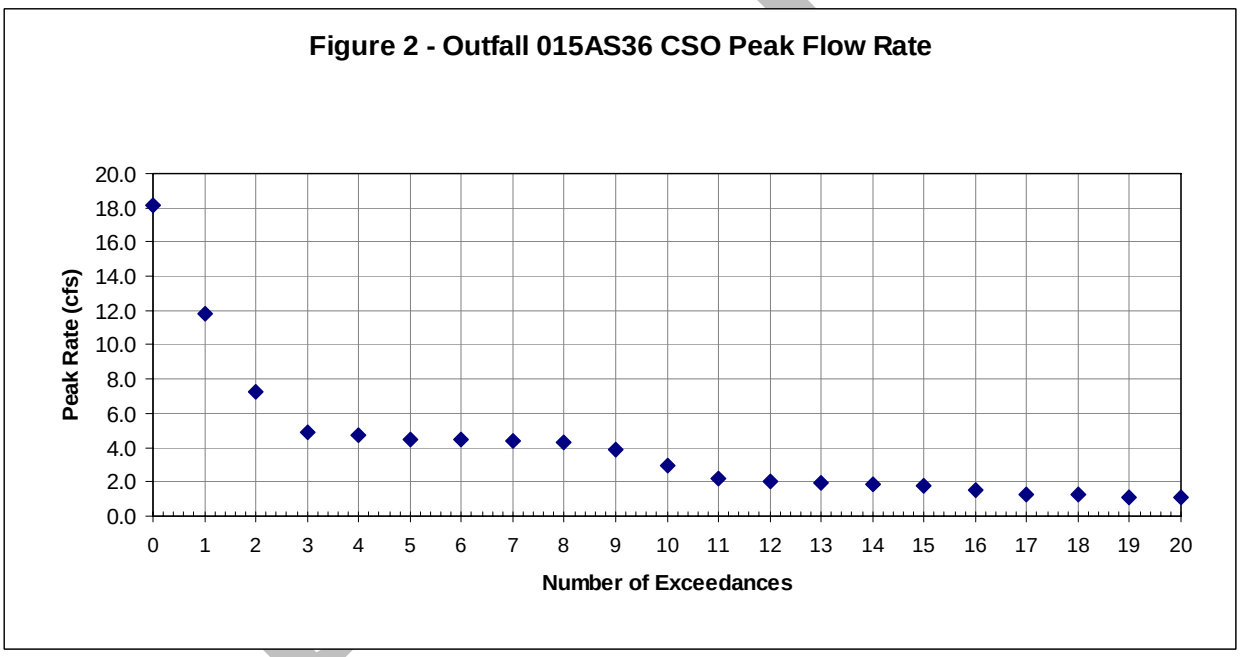


There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 015AS36, adjacent to Saw Mill Run Boulevard. The site is generally bounded by Saw Mill Run Boulevard to the west and steep slopes to the north, south and east.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 015AS36. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-015AS36: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-015AS36: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-015AS36: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-015AS36: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-015AS36: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-015AS36: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-015AS36: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

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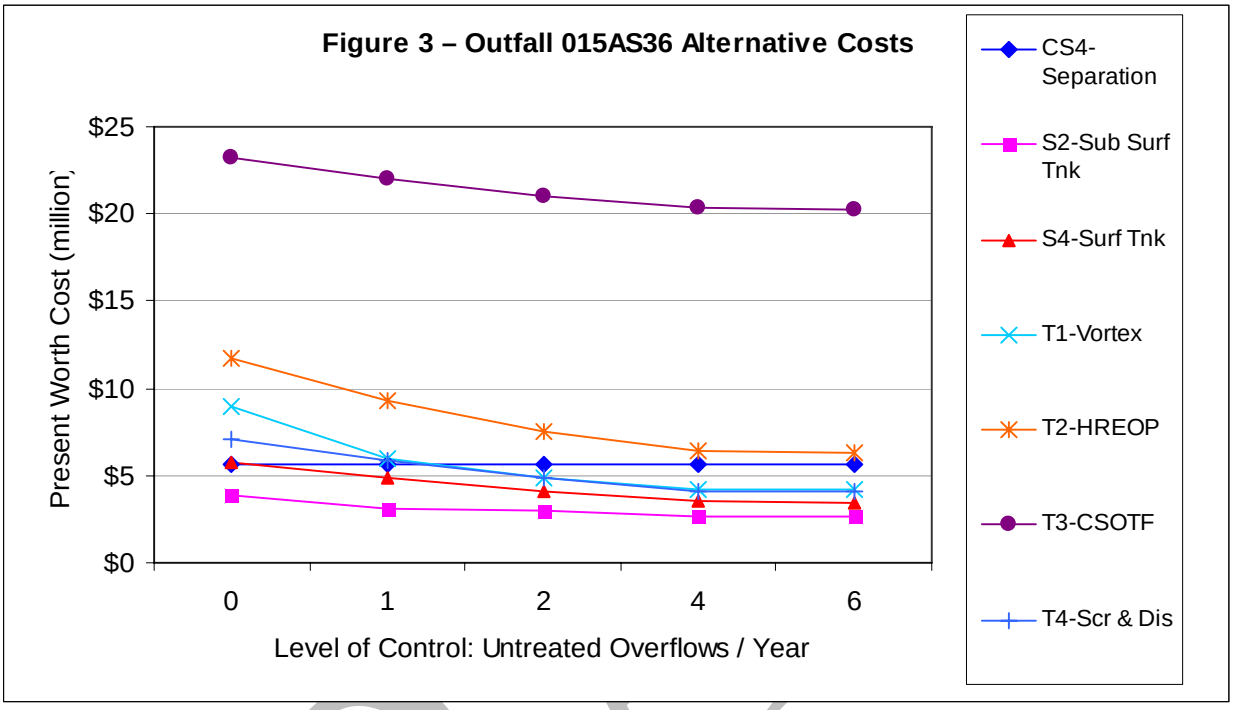
*Figure 3 – Outfall 015AS36 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-015AS36: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.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**Significant Issues**

It appears that sufficient space exists to construct a sub-surface storage facility for all control levels.

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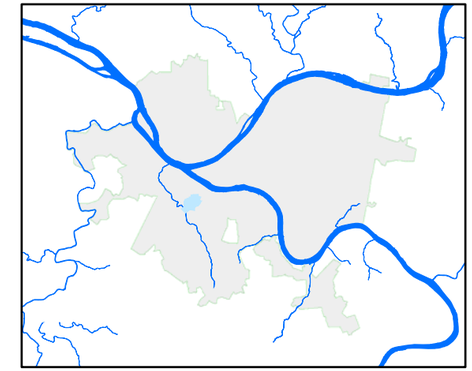

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

200 0 200 Feet

# Attachment 1
# S-36
# Tributary Area Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0220.pdf

# Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 37 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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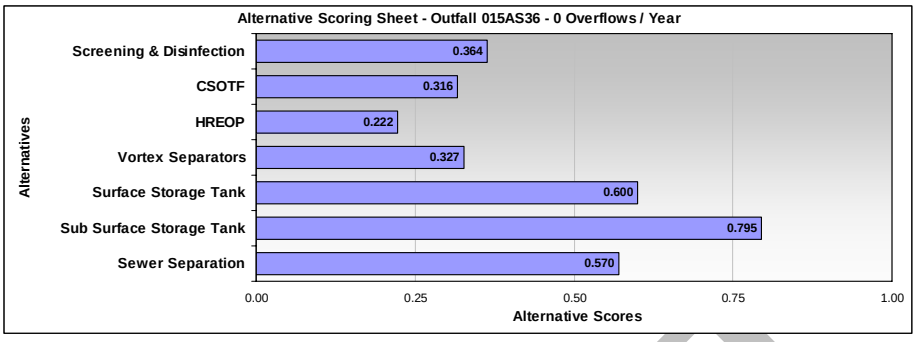
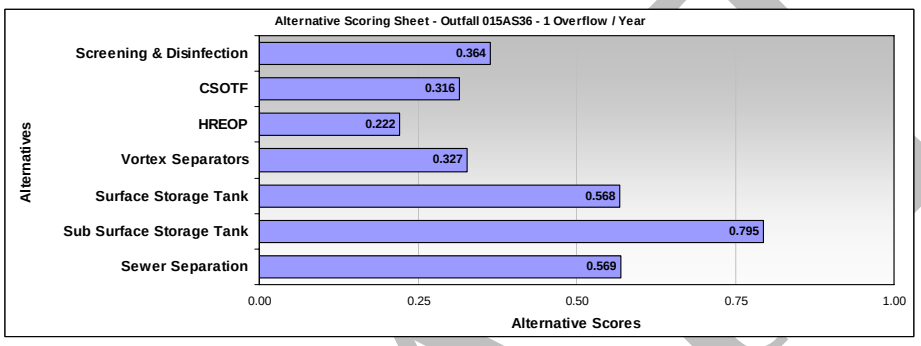
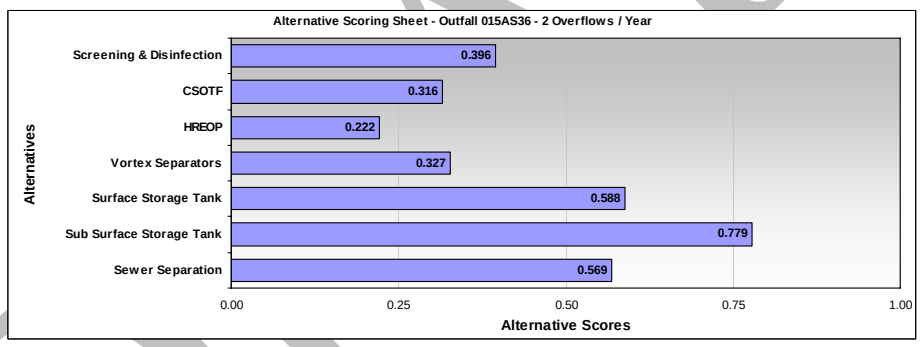
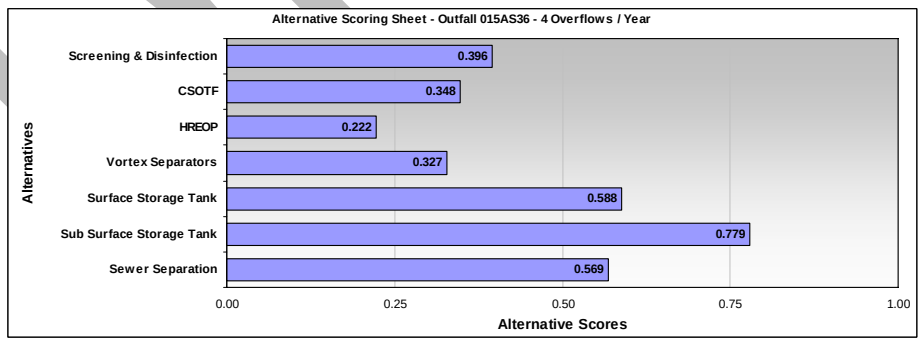
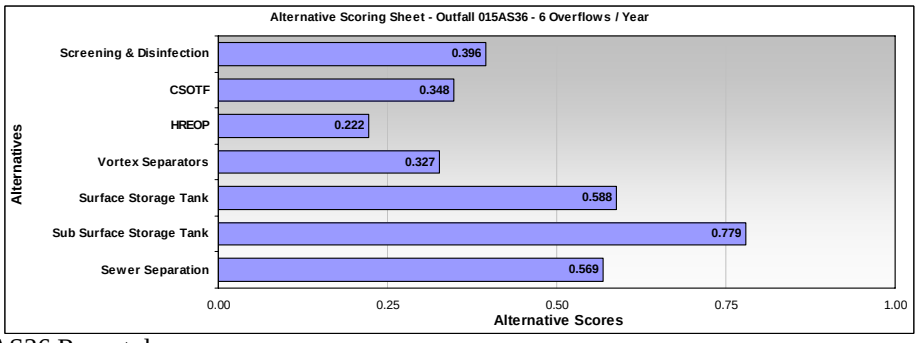
# Attachment 3 – Alternative Scoring Sheet





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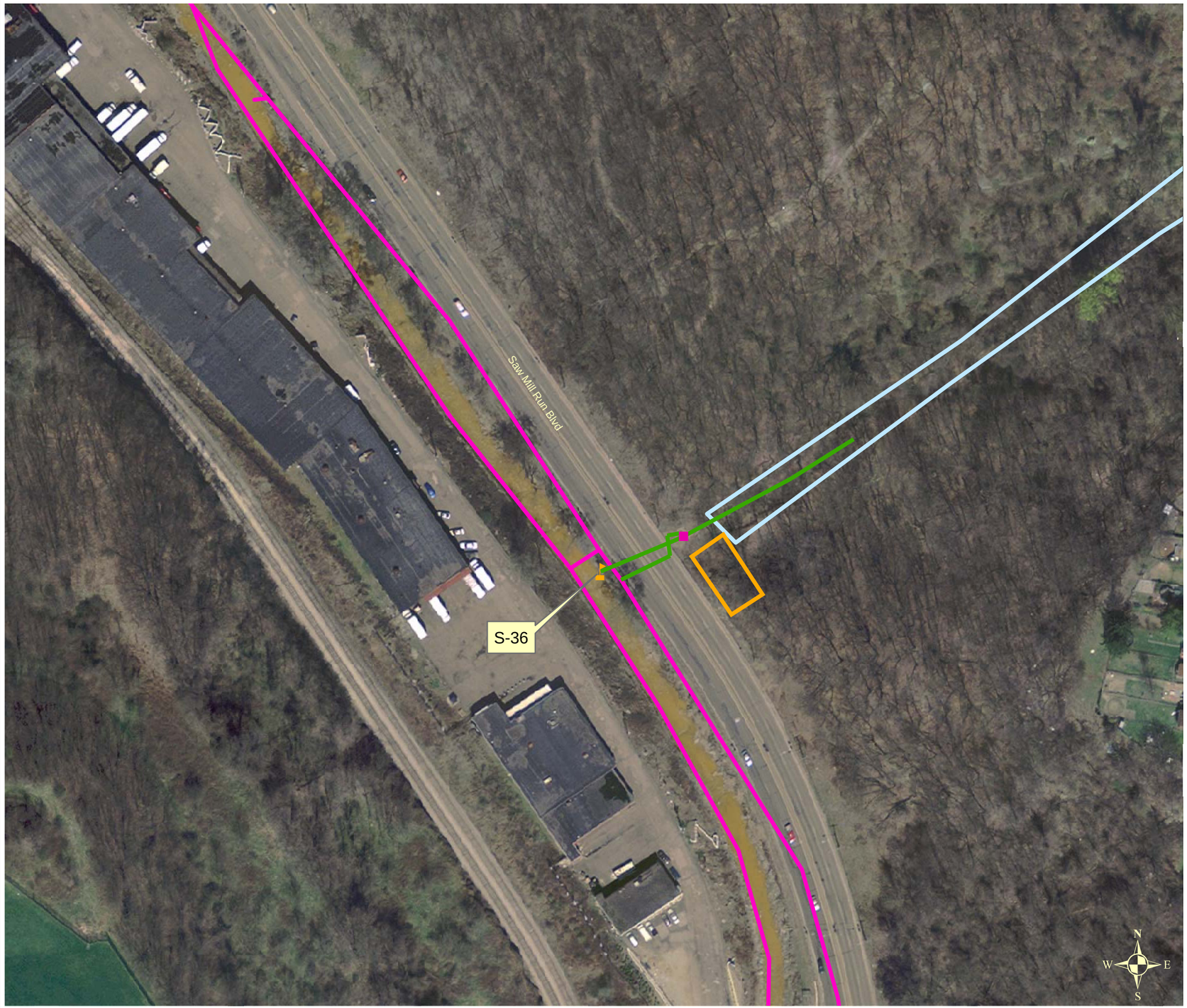


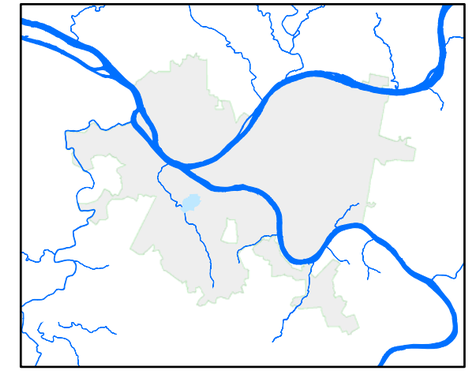

Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# S-36
# Facilities Boundary Map
# Sawmill Run Interceptor Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0220.pdf

## D.27.1 CSO019M001 – MCCARTNEY RUN SEWERSHED – NPDES# 019M001

### Description of Outfall

Outfall 019M001 conveys overflows from the PWSA diversion structures 019J001, 019K001, 019L001, 019S001, 040M001, 040M002 and ALCOSAN diversion structure S-42A. The McCartney Run sewersheds are located in portions of Crafton Heights, Elliott, Ridgemont, West End and West Wood sections in the City of Pittsburgh and in portions of Green Tree Borough. Outfall 019M001 is located along McCartney Run near the intersection of Wabash Street and Greentree Road in the City of Pittsburgh. The McCartney Run sewershed, including the ALCOSAN diversion chamber S-42 area (ACSO 019MS42), includes approximately 595 acres of residential, business and commercial users. The outfall 019M001 sewershed consists of 583 acres, or approximately 98% of the total service area. The McCartney Run sewershed, including the S-42 area, is comprised of approximately 379 manholes and 82,994 linear feet (15.7 miles) of mostly combined sewer up to 48 inches in diameter.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 019M001 typically experiences 82 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 019M001 is approximately 3.82 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 019M001 is approximately 152.50 CFS. *Figure 1 – Outfall 019M001 CSO Volume* and *Figure 2 – Outfall 019M001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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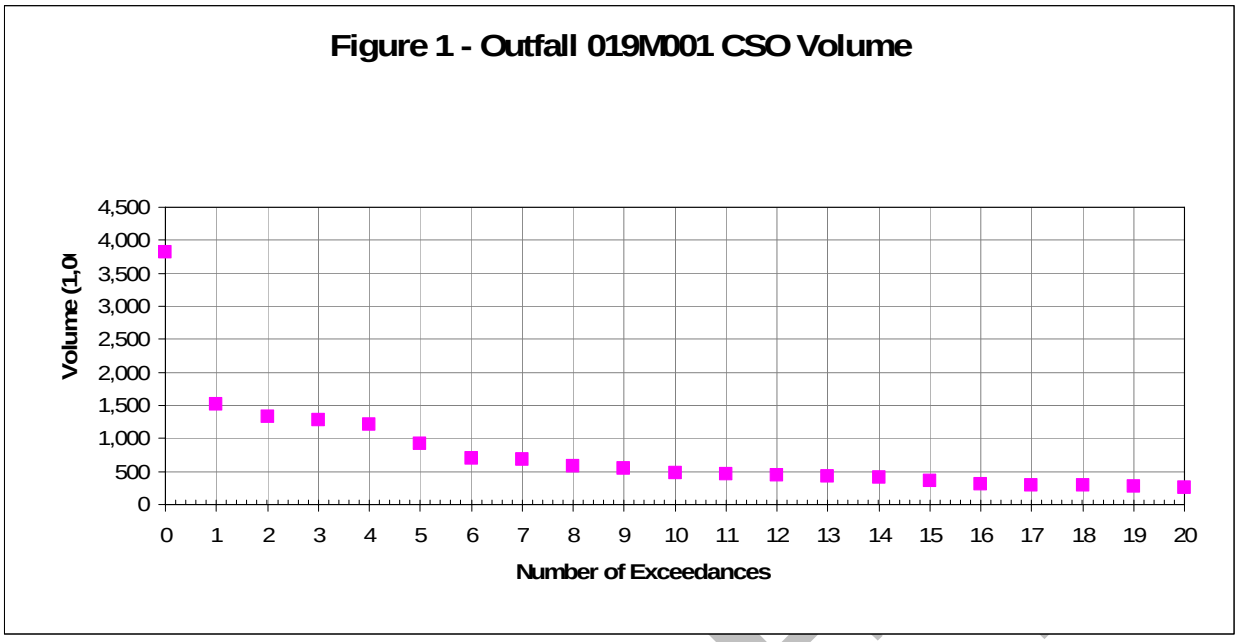


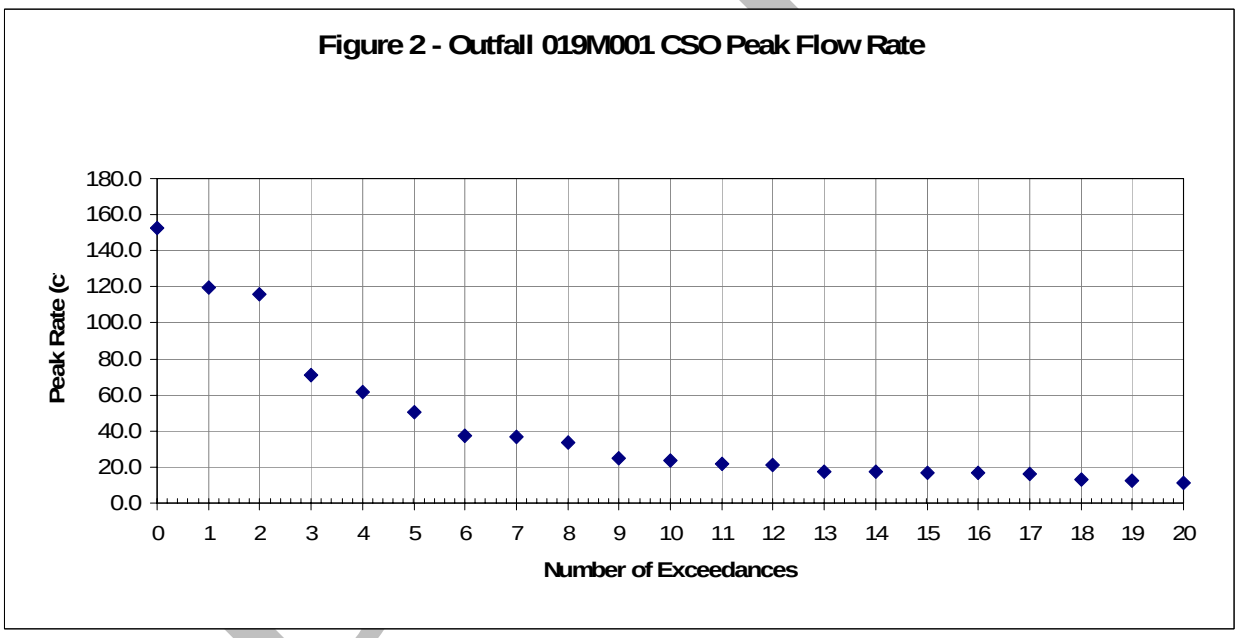


Very limited space exists adjacent to the outfall. There is an existing parking lot near the intersection of Wabash Street and McCartney Street. This parking facility and adjacent structure may be able to be procured for a storage or treatment facility. Surrounding area includes dense residential and commercial buildings. The site is generally bounded by Saw Mill Run to the east, Wabash Street to the west and private development to the north and south.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 019M001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-019M001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-019M001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-019M001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

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***Treatment Alternatives***

T1-019M001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-019M001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-019M001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-019M001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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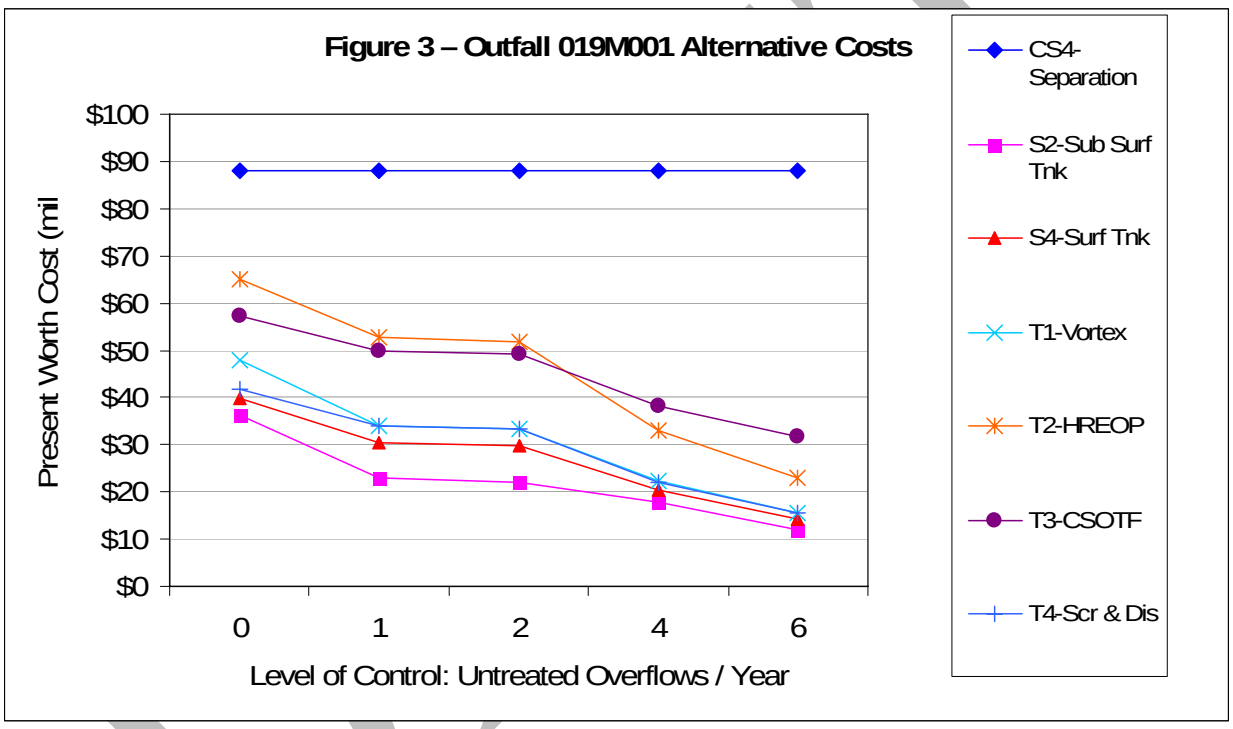
**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 019M001 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-019M001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Space is limited for the construction of a sub-surface storage facility for all control levels. It appears that significant site work and property acquisition will be required for this alternative.

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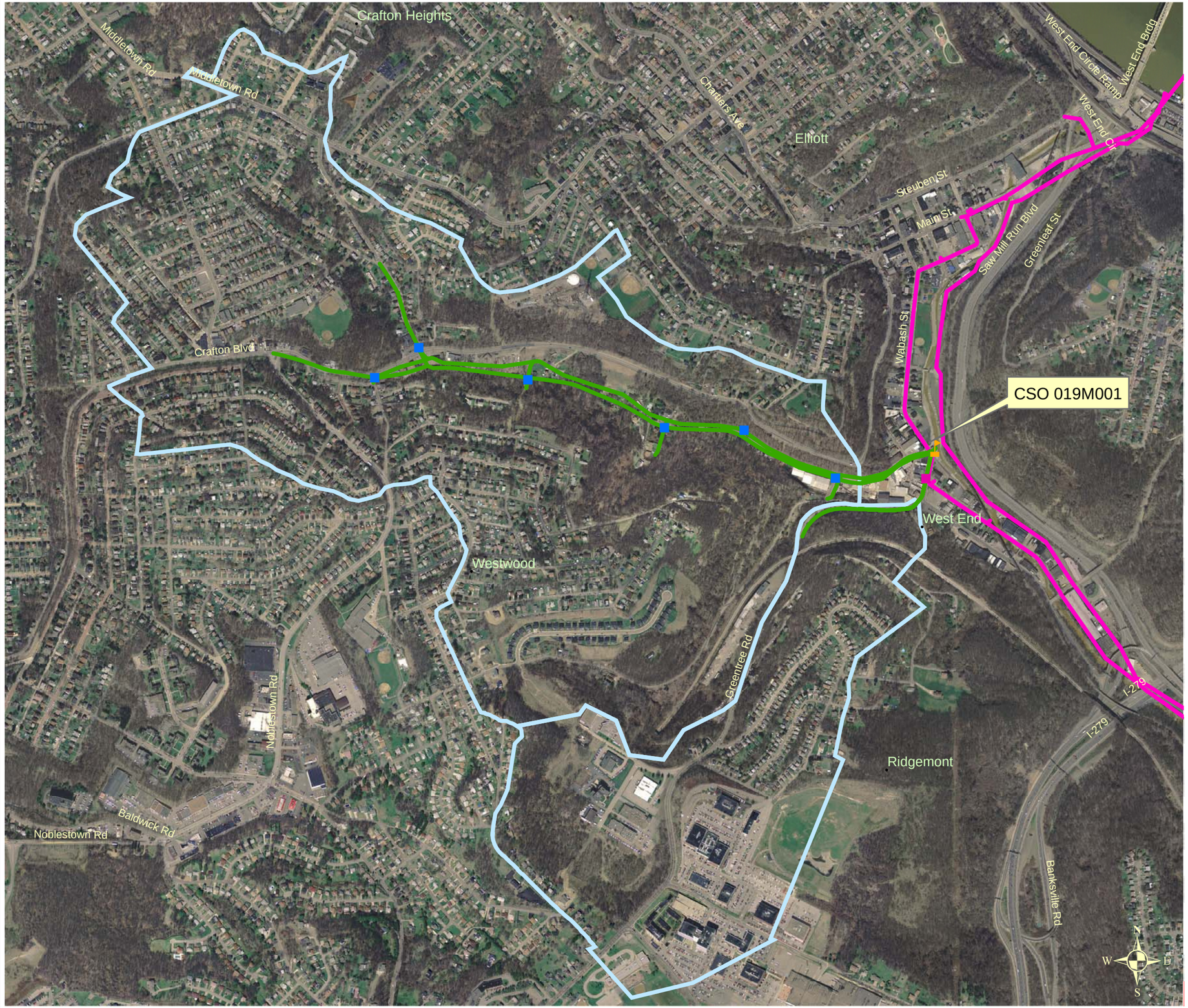


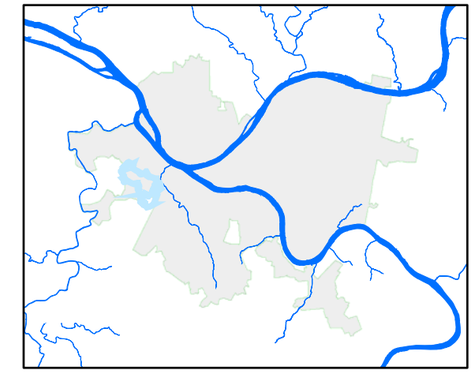

**Area Overview**

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- PWSA Diversion Structure
- Combined Sewer Outfall

1,000 0 1,000
Feet

# Attachment 1
# CSO 019M001
# Tributary Area Map
# McCartney Run Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0221.pdf

Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | A relief sewer will not be evaluated. |
| Sewer separation | Y | Sewer separation within the 583 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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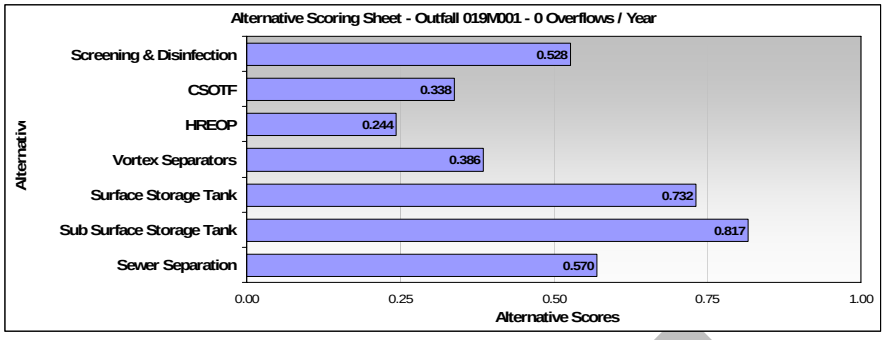
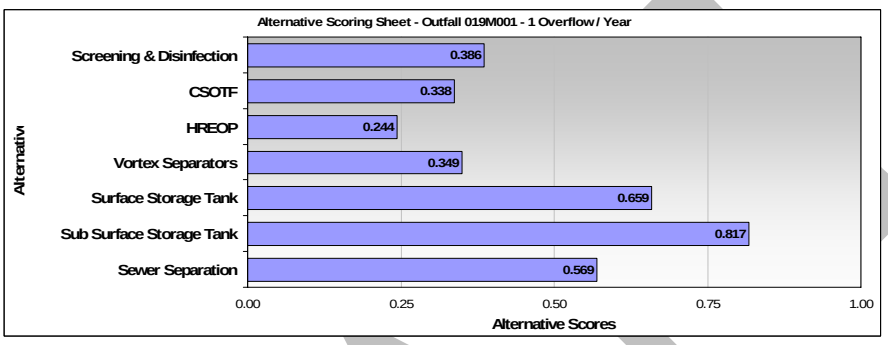
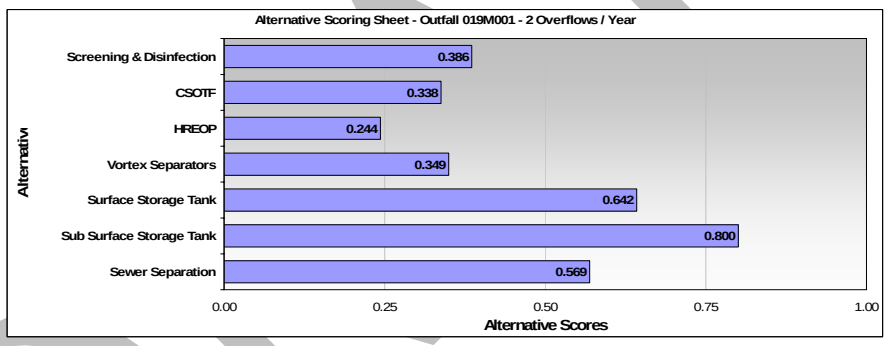
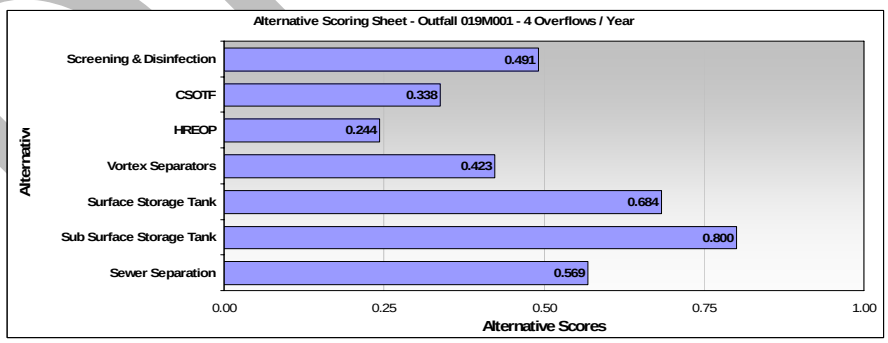
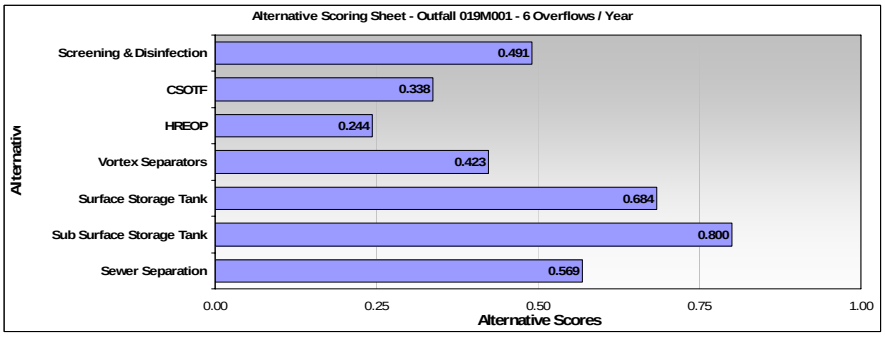
# Attachment 3 – Alternative Scoring Sheet

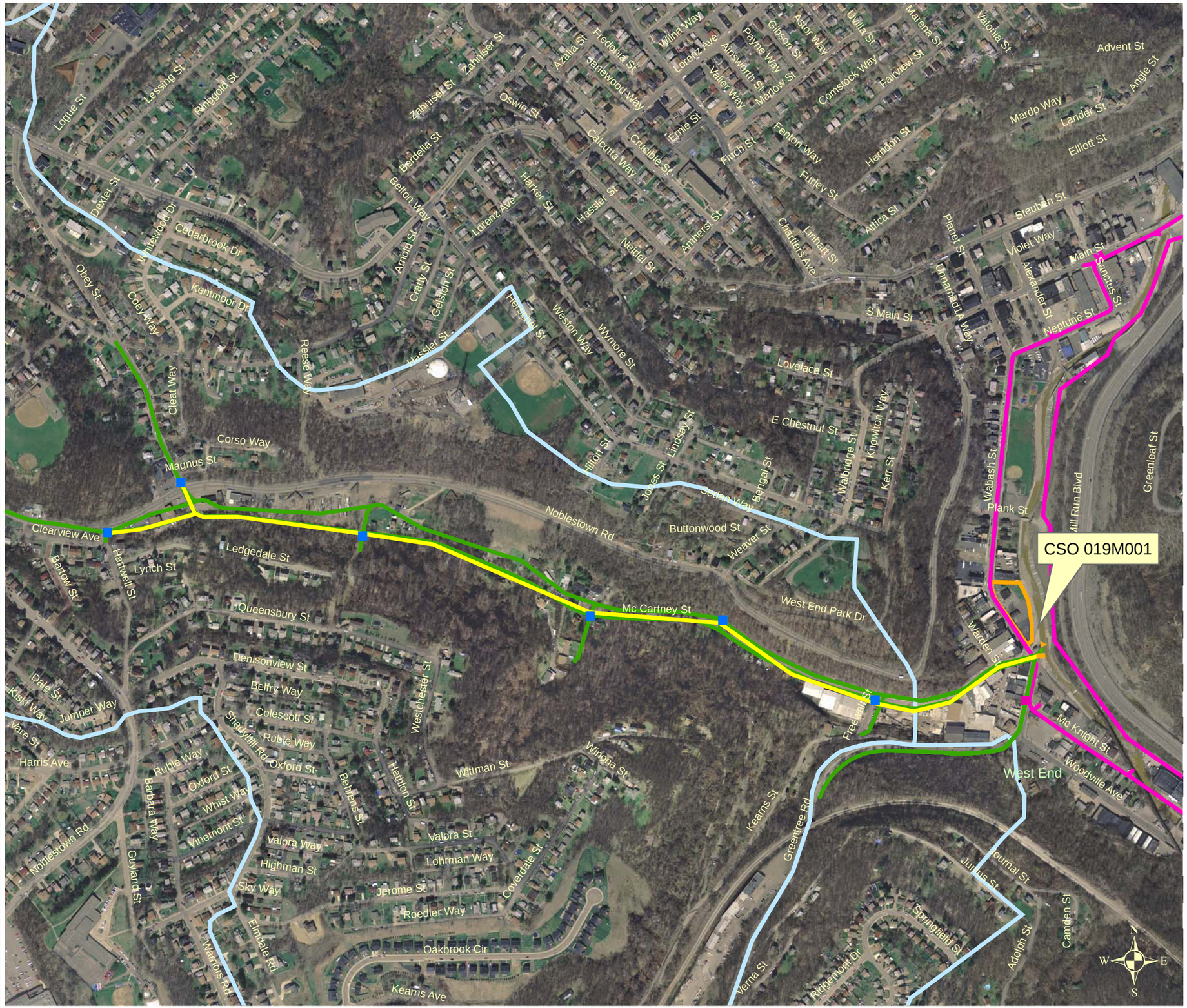


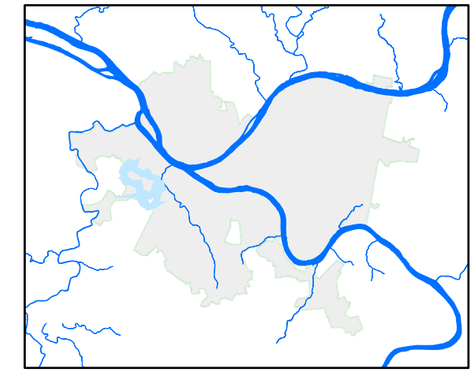





Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- Consolidation Pipe
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- PWSA Diversion Structure
- Combined Sewer Outfall

500 250 0 500 Feet

# Attachment 4
# CSO 019M001
# Facilities Boundary Map
# McCartney Run Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0221.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 2 | 2 | 4 | 4 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 4 | 4 | 4 | 3 | 3 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 1 | 1 | 3 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 4 | 1 | 1 | 3 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific. | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 1 | 1 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.732** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.659** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.642** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.684** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.684** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.423** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.423** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.528** |

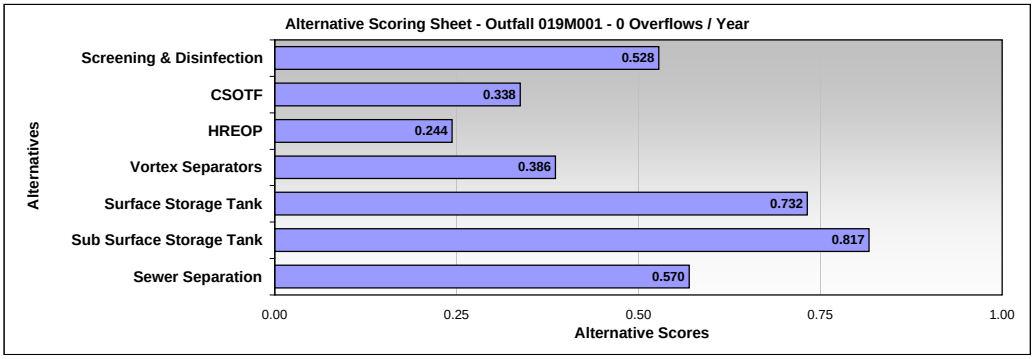
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

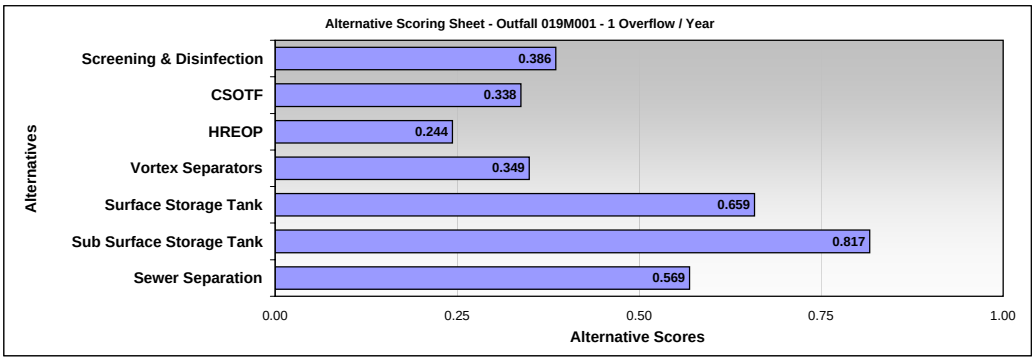
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

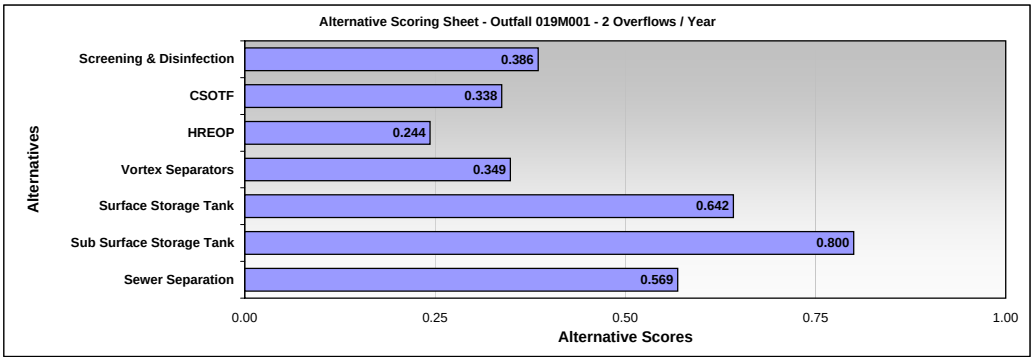
Total Score

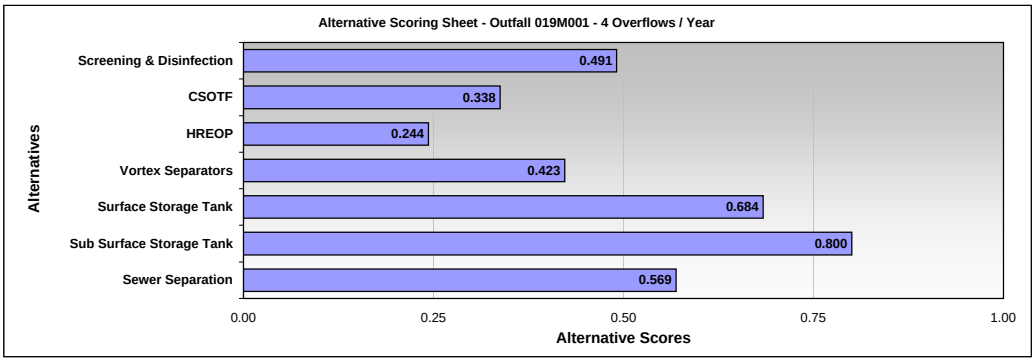
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.491** |

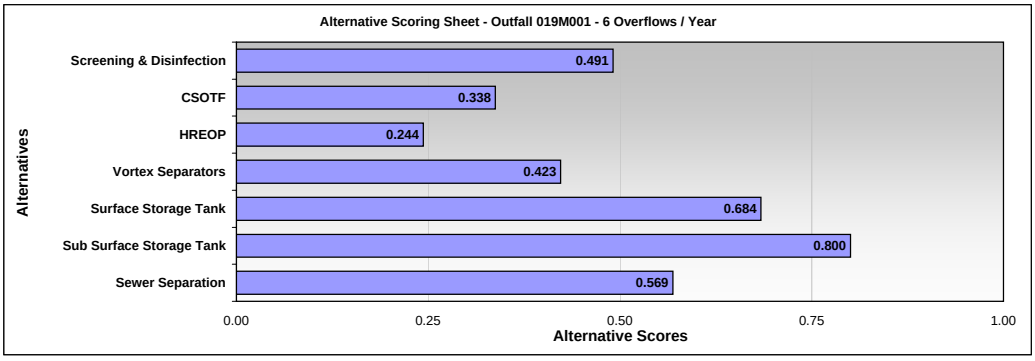
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.491** |


Alternative Scoring Sheet - Outfall 019M001 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.528
0.338
0.244
0.386
0.732
0.817
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 019M001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.659
0.817
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 019M001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.642
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 019M001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.491
0.338
0.244
0.423
0.684
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 019M001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.491
0.338
0.244
0.423
0.684
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 583 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **87,450,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 253,955 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **508,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **87,997,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 3.82 | 511,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 4.49 | 601,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 246 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 164 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 4.53 | 605,160 | **Sufficient Volume** |
| Tank Area (SF) | | 40,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **4,063,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 98.57 | 152.52 | = Peak Rate |
| Force Main Diameter (In) | | 68 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,677,000** | **$ 82,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 152.52 | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **10,850,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 902,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 4,510 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **298,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 98.57 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,976,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 76,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **152,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **34,137,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 3.82 | | 511,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 4.49 | | 601,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 246 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 164 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 4.53 | | 605,160 | **Sufficient Volume** |
| Tank Area (SF) | 40,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **12,677,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 3.82 | | 5.91 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 13 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 2,021,000** | **$** | **22,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 152.52 | | | Ref: Technical Parameters |
| Diameter (In) | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 10,850,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 902,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 45,100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 1,811,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 98.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 4,976,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | $ | - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 76,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 152,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **32,548,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 98.57 | | 152.52 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 11 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **4,989,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 108.42 | | 167.77 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 72 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **14,879,000** | **$** | **88,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 152.52 | | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **10,850,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 317,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 15,850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **798,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 98.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,976,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 108.42 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 163 | | 78 | |
| Passes / Detention (Min) | | 7 | | **15.16** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,070,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 102,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **204,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **39,153,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 98.57 | | 152.52 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 16,500 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 183 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 91 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.49 | | 199,836 | |
| **Construction Cost (CSOTF)** | **$** | **16,590,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 98.57 | | 152.52 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 68 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,677,000** | **$** | **82,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 152.52 | | | Ref: CSO Statistics |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **10,850,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 300,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 15,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **764,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 98.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,976,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 98.57 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 156 | | 74 | |
| Passes / Detention (Min) | | 7 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,961,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 45,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **90,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **49,029,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 98.57 | | 152.52 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,160 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 49 | | **OK** | Input by Engineer |
| Width (Ft) | | 25 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **17,549,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 108.42 | | 167.77 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 72 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **14,879,000** | **$** | **88,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 152.52 | | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **10,850,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 29,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **122,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 98.57 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,976,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 108.42 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 163 | | 78 | Input by Engineer |
| Passes / Detention (Min) | | 7 | | **15.16** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,070,000 | $ | 2,508,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,578,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 68,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **136,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **53,217,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 510,620 | CF |
| | 3.82 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 152.52 | CFS |
| | 98.57 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 98.57 | | 152.52 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **4,976,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 98.57 | | 152.52 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 68 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **13,677,000** | **$** | **82,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 152.52 | | | Ref: CSO Statistics |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **10,850,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 30,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,530 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **128,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 98.57 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 156 | | 74 | |
| Passes / Detention (Min) | | 7 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,961,000 | $ | 2,342,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,303,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 33,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **66,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **34,121,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 583 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **87,450,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 253,955 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **508,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **87,997,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 1.52 | 204,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 1.79 | 240,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 156 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 104 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 1.82 | 243,360 | **Sufficient Volume** |
| Tank Area (SF) | | 16,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,492,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 77.11 | 119.31 | = Peak Rate |
| Force Main Diameter (In) | | 60 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **11,059,000** | **$ 72,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 119.31 | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 360,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,800 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **145,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 77.11 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,982,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 42,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **84,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **25,569,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.52 | | 204,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.79 | | 240,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 156 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 104 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.82 | | 243,360 | **Sufficient Volume** |
| Tank Area (SF) | 16,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **5,606,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.52 | | 2.36 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 8 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,622,000** | **$** | **18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 119.31 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 360,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 18,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **882,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 77.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,982,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 42,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **84,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **20,929,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 77.11 | | 119.31 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 84.82 | | 131.25 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 63 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **12,000,000** | **$** | **76,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 119.31 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 77.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,982,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 84.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 144 | | 69 | |
| Passes | | 5 | | **15.14** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,793,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 80,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **160,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **27,006,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 77.11 | 119.31 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 12,900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 162 | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 81 | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.18 | 157,464 | |
| **Construction Cost (CSOTF)** | **$** | **16,481,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 77.11 | 119.31 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 60 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **11,059,000** | **$ 72,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 119.31 | | Ref: CSO Statistics |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 236,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 11,800 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **633,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 77.11 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,982,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 77.11 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 138 | 66 | |
| Passes | | 5 | 15.27 | Ref: Tech Param-15 min minimum |
| | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **1,690,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 36,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **72,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **42,724,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 77.11 | | 119.31 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 910 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 44 | | **OK** | Input by Engineer |
| Width (Ft) | | 22 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **13,825,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 84.82 | | 131.25 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 63 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **12,000,000** | **$** | **76,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 119.31 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **102,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 77.11 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,982,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 84.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 144 | | 69 | Input by Engineer |
| Passes | | 5 | | **15.14** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,793,000 | $ | 1,913,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,706,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 58,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **116,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **42,542,000** | | | |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 203,696 | CF |
| | 1.52 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 119.31 | CFS |
| | 77.11 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 77.11 | | 119.31 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,982,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 77.11 | | 119.31 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 60 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **11,059,000** | **$** | **72,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 119.31 | | | Ref: CSO Statistics |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **106,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 77.11 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 138 | | 66 | |
| Passes | | 5 | | **15.27** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,690,000 | $ | 1,795,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,485,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 31,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **62,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **27,501,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 583 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **87,450,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 253,955 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **508,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **87,997,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.33 | | 178,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.57 | | 209,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 146 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 97 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.59 | | 212,430 | **Sufficient Volume** |
| Tank Area (SF) | 14,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,291,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 74.74 | | 115.65 | = Peak Rate |
| Force Main Diameter (In) | 59 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **10,770,000** | **$** | **71,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 115.65 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 314,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,570 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **130,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 74.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,873,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 39,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **78,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **24,948,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.33 | | 178,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.57 | | 209,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 146 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 97 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.59 | | 212,430 | **Sufficient Volume** |
| Tank Area (SF) | 14,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **5,023,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.33 | | 2.06 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 8 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,419,000** | **$** | **18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 115.65 | | | Ref: Technical Parameters |
| Diameter (In) | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 314,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 15,700 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **792,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 74.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **3,873,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 39,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **78,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **19,938,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 74.74 | | 115.65 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 82.22 | | 127.22 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 62 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **11,682,000** | **$** | **74,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 115.65 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 74.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,873,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 82.22 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 142 | | 68 | |
| Passes | | 5 | | **15.18** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,759,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 78,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **156,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **26,539,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 74.74 | 115.65 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 12,500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 159 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 80 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.14 | 152,640 | |
| **Construction Cost (CSOTF)** | **$** | **16,471,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 74.74 | 115.65 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 59 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,770,000** | **$ 71,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 115.65 | | Ref: CSO Statistics |
| Diameter (In) | | 78 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 229,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 11,450 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **619,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 74.74 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,873,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 74.74 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 136 | 65 | |
| Passes | | 5 | **15.29** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,657,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 35,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **70,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **42,266,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 74.74 | | 115.65 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 880 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 43 | | **OK** | Input by Engineer |
| Width (Ft) | | 21 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **13,420,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 82.22 | | 127.22 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 62 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **11,682,000** | **$** | **74,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 115.65 | | | Ref: Technical Parameters |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 22,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **99,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 74.74 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,873,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 82.22 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 142 | | 68 | Input by Engineer |
| Passes | | 5 | | **15.18** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,759,000 | $ | 1,873,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,632,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 57,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **114,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **41,629,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 178,373 | CF |
| | 1.33 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 115.65 | CFS |
| | 74.74 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **2 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 74.74 | | 115.65 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,873,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 74.74 | | 115.65 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 59 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **10,770,000** | **$** | **71,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 115.65 | | | Ref: CSO Statistics |
| Diameter (In) | | 78 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **8,696,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 23,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,160 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **103,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 74.74 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 136 | | 65 | |
| Passes | | 5 | | **15.29** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,657,000 | $ | 1,757,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,414,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 30,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **60,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **27,026,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 583 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **87,450,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 253,955 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **508,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **87,997,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.21 | | 162,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.42 | | 191,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 139 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 93 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.45 | | 193,905 | **Sufficient Volume** |
| Tank Area (SF) | 13,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,161,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 39.70 | | 61.43 | = Peak Rate |
| Force Main Diameter (In) | 43 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **6,495,000** | **$** | **52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 61.43 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **6,828,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 287,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,440 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **122,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 39.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,251,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 37,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **74,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **17,022,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.21 | | 162,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.42 | | 191,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 139 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 93 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.45 | | 193,905 | **Sufficient Volume** |
| Tank Area (SF) | 13,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **4,641,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.21 | | 1.87 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 8 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,313,000** | **$** | **18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 61.43 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **6,828,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 287,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 14,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **738,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 39.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,251,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 37,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **74,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **15,902,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 39.70 | | 61.43 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 43.67 | | 67.58 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 45 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,980,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 61.43 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **6,828,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 39.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,251,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 43.67 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 104 | | 50 | |
| Passes | | 5 | | **15.39** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,177,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 41,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **82,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **17,671,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 39.70 | 61.43 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 6,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 117 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 58 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.61 | 81,432 | |
| **Construction Cost (CSOTF)** | **$** | **16,378,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 39.70 | 61.43 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 43 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,495,000** | **$ 52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 61.43 | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **6,828,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 122,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 6,100 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **378,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 39.70 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,251,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 39.70 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 99 | 48 | |
| Passes | | 3 | **15.47** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,108,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 21,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **33,571,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 39.70 | | 61.43 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 470 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 32 | | **OK** | Input by Engineer |
| Width (Ft) | | 16 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **7,553,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 43.67 | | 67.58 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 45 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,980,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 61.43 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **6,828,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 39.70 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,251,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 43.67 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 104 | | 50 | Input by Engineer |
| Passes | | 5 | | **15.39** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,177,000 | $ | 1,214,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,391,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 40,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **80,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **26,237,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 161,777 | CF |
| | 1.21 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 61.43 | CFS |
| | 39.70 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **4 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 39.70 | | 61.43 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,251,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 39.70 | | 61.43 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 43 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,495,000** | **$** | **52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 61.43 | | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **6,828,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,300 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 620 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **63,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 39.70 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 99 | | 48 | |
| Passes | | 3 | | **15.47** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,108,000 | $ | 992,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,100,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 27,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **17,882,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 583 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **87,450,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 253,955 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **508,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **87,997,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| **SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.70 | | 94,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.83 | | 111,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 106 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 71 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.84 | | 112,890 | **Sufficient Volume** |
| Tank Area (SF) | 8,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **643,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 24.33 | | 37.65 | = Peak Rate |
| Force Main Diameter (In) | 34 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **4,620,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 37.65 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **4,563,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 167,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 840 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **80,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 24.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,539,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 30,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **60,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **11,586,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| **SUB-SURFACE STORAGE TANK** | | | | |
| **6 Overflows / Year** | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.70 | | 94,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.83 | | 111,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 106 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 71 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.84 | | 112,890 | **Sufficient Volume** |
| Tank Area (SF) | 8,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **3,081,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.70 | | 1.09 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 6 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 883,000** | | **$ 16,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 37.65 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 5,450 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 4,563,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 167,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 8,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 483,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 24.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 1,539,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 30,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 60,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **10,664,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | | |
| **6 Overflows / Year** | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 24.33 | | 37.65 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 26.76 | | 41.41 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 36 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,917,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 37.65 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **4,563,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 24.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,539,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 26.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 82 | | 39 | |
| Passes | | 3 | | **15.44** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **874,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 25,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **12,286,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 24.33 | 37.65 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 4,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 92 | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 46 | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.38 | 50,784 | |
| **Construction Cost (CSOTF)** | **$** | **16,371,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 24.33 | 37.65 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 34 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,620,000** | **$ 42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 37.65 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **4,563,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 76,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,800 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **261,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 24.33 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,539,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 24.33 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 78 | 37 | |
| Passes | | 3 | 15.33 | Ref: Tech Param-15 min minimum |
| | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **828,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 15,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **30,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **28,293,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 24.33 | | 37.65 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 290 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 25 | | **OK** | Input by Engineer |
| Width (Ft) | | 13 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **5,056,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 26.76 | | 41.41 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 36 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,917,000** | **$** | **44,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 37.65 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **4,563,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 8,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **45,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 24.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,539,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 26.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 82 | | 39 | Input by Engineer |
| Passes | | 3 | | **15.44** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 874,000 | $ | 757,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,631,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 33,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **66,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **17,900,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 82 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 94,073 | CF |
| | 0.70 | MG |
| Total Volume | 2,606,130 | CF |
| | 19.49 | MG |
| Peak Rate | 37.65 | CFS |
| | 24.33 | MGD |

| Capital Costs - 019M001 / Sewershed CSO 019M001 - Individual DCs | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 24.33 | | 37.65 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,539,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 24.33 | | 37.65 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 34 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,620,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 37.65 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 5,450 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **4,563,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 380 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **43,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 24.33 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 78 | | 37 | |
| Passes | | 3 | | **15.33** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 828,000 | $ | 708,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,536,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **12,432,000** | | | |

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| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 98.57 | $403,739 | 20 | 10.910 | $4,404,769 |
| | Tank O&M | No. Events / Yr | 82 | $60,538 | 50 | 14.484 | $876,812 |
| | | Const Cost ($) | $4,063,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 99 | $17,379 | 20 | 10.910 | $189,608 |
| | Odor Control O&M | Capacity (cfm) | 4,510 | $15,785 | 20 | 10.910 | $172,213 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $70,147 |
| | | | **Total Annual O&M** | **$498,000** | | **Total PW O&M** | **$5,714,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 3.82 | $46,017 | 20 | 10.910 | $502,048 |
| | Tank O&M | No. Events / Yr | 82 | $82,073 | 50 | 14.484 | $1,188,716 |
| | | Const Cost ($) | $12,677,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 99 | $17,379 | 20 | 10.910 | $189,608 |
| | Odor Control O&M | Capacity (cfm) | 45,100 | $157,850 | 20 | 10.910 | $1,722,134 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,706 |
| | | | **Total Annual O&M** | **$304,000** | | **Total PW O&M** | **$3,629,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 98.57 | $403,739 | 20 | 10.910 | $4,404,769 |
| | Sed. Basin O&M | Flow Rate (mgd) | 98.57 | $11,089 | 50 | 14.484 | $160,606 |
| | Screening O&M | Flow Rate (mgd) | 98.57 | $17,379 | 20 | 10.910 | $189,608 |
| | Disinfection O&M | Flow Rate (mgd) | 98.57 | $263,553 | 20 | 10.910 | $2,875,344 |
| | Odor Control O&M | Capacity (cfm) | 15,000.00 | $52,500 | 20 | 10.910 | $572,772 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $76,749 |
| | | | **Total Annual O&M** | **$749,000** | | **Total PW O&M** | **$8,280,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 108.42 | $430,284 | 20 | 10.910 | $4,694,373 |
| | HREP O&M | Flow Rate (mgd) | 98.57 | $346,514 | 20 | 10.910 | $3,780,444 |
| | Screening O&M | Flow Rate (mgd) | 98.57 | $17,379 | 20 | 10.910 | $189,608 |
| | Disinfection O&M | Flow Rate (mgd) | 108.42 | $279,308 | 20 | 10.910 | $3,047,237 |
| | Odor Control O&M | Capacity (cfm) | 1,450.00 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $127,937 |
| | | | **Total Annual O&M** | **$1,079,000** | | **Total PW O&M** | **$11,895,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 108.42 | $430,284 | 20 | 10.910 | $4,694,373 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 98.57 | $11,089 | 20 | 10.910 | $120,978 |
| | Screening O&M | Flow Rate (mgd) | 98.57 | $17,379 | 20 | 10.910 | $189,608 |
| | Disinfection O&M | Flow Rate (mgd) | 108.42 | $279,308 | 20 | 10.910 | $3,047,237 |
| | Odor Control O&M | Capacity (cfm) | 15,850.00 | $55,475 | 20 | 10.910 | $605,229 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $88,827 |
| | | | **Total Annual O&M** | **$794,000** | | **Total PW O&M** | **$8,746,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 98.57 | $403,739 | 20 | 10.910 | $4,404,769 |
| | Screening O&M | Flow Rate (mgd) | 98.57 | $17,379 | 20 | 10.910 | $189,608 |
| | Disinfection O&M | Flow Rate (mgd) | 98.57 | $263,553 | 20 | 10.910 | $2,875,344 |
| | Odor Control O&M | Capacity (cfm) | 1,530.00 | $5,355 | 20 | 10.910 | $58,423 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $75,019 |
| | | | **Total Annual O&M** | **$691,000** | | **Total PW O&M** | **$7,603,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 77.11 | $342,660 | 20 | 10.910 | $3,738,403 |
| | Tank O&M | No. Events / Yr | 82 | $54,111 | 50 | 14.484 | $783,719 |
| | | Const Cost ($) | $1,492,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 77 | $14,913 | 20 | 10.910 | $162,696 |
| | Odor Control O&M | Capacity (cfm) | 1,800 | $6,300 | 20 | 10.910 | $68,733 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $56,346 |
| | | | **Total Annual O&M** | **$418,000** | | **Total PW O&M** | **$4,810,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.52 | $24,904 | 20 | 10.910 | $271,704 |
| | Tank O&M | No. Events / Yr | 82 | $64,396 | 50 | 14.484 | $932,682 |
| | | Const Cost ($) | $5,606,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 77 | $14,913 | 20 | 10.910 | $162,696 |
| | Odor Control O&M | Capacity (cfm) | 18,000 | $63,000 | 20 | 10.910 | $687,326 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,848 |
| | | | **Total Annual O&M** | **$168,000** | | **Total PW O&M** | **$2,074,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 77.11 | $342,660 | 20 | 10.910 | $3,738,403 |
| | Sed. Basin O&M | Flow Rate (mgd) | 77.11 | $8,675 | 50 | 14.484 | $125,642 |
| | Screening O&M | Flow Rate (mgd) | 77.11 | $14,913 | 20 | 10.910 | $162,696 |
| | Disinfection O&M | Flow Rate (mgd) | 77.11 | $226,940 | 20 | 10.910 | $2,475,900 |
| | Odor Control O&M | Capacity (cfm) | 11,800.00 | $41,300 | 20 | 10.910 | $450,580 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $62,270 |
| | | | **Total Annual O&M** | **$635,000** | | **Total PW O&M** | **$7,015,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 84.82 | $365,189 | 20 | 10.910 | $3,984,194 |
| | HREP O&M | Flow Rate (mgd) | 77.11 | $299,926 | 20 | 10.910 | $3,272,170 |
| | Screening O&M | Flow Rate (mgd) | 77.11 | $14,913 | 20 | 10.910 | $162,696 |
| | Disinfection O&M | Flow Rate (mgd) | 84.82 | $240,507 | 20 | 10.910 | $2,623,913 |
| | Odor Control O&M | Capacity (cfm) | 1,150.00 | $4,025 | 20 | 10.910 | $43,913 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $102,549 |
| | | | **Total Annual O&M** | **$925,000** | | **Total PW O&M** | **$10,189,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 84.82 | $365,189 | 20 | 10.910 | $3,984,194 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 77.11 | $8,675 | 20 | 10.910 | $94,641 |
| | Screening O&M | Flow Rate (mgd) | 77.11 | $14,913 | 20 | 10.910 | $162,696 |
| | Disinfection O&M | Flow Rate (mgd) | 84.82 | $240,507 | 20 | 10.910 | $2,623,913 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $64,668 |
| | | | **Total Annual O&M** | **$630,000** | | **Total PW O&M** | **$6,930,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 77.11 | $342,660 | 20 | 10.910 | $3,738,403 |
| | Screening O&M | Flow Rate (mgd) | 77.11 | $14,913 | 20 | 10.910 | $162,696 |
| | Disinfection O&M | Flow Rate (mgd) | 77.11 | $226,940 | 20 | 10.910 | $2,475,900 |
| | Odor Control O&M | Capacity (cfm) | 1,200.00 | $4,200 | 20 | 10.910 | $45,822 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $60,837 |
| | | | **Total Annual O&M** | **$589,000** | | **Total PW O&M** | **$6,484,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 74.74 | $335,603 | 20 | 10.910 | $3,661,404 |
| | Tank O&M | No. Events / Yr | 82 | $53,608 | 50 | 14.484 | $776,441 |
| | | Const Cost ($) | $1,291,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 75 | $14,651 | 20 | 10.910 | $159,842 |
| | Odor Control O&M | Capacity (cfm) | 1,570 | $5,495 | 20 | 10.910 | $59,950 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $54,830 |
| | | | **Total Annual O&M** | **$410,000** | | **Total PW O&M** | **$4,712,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.33 | $22,791 | 20 | 10.910 | $248,644 |
| | Tank O&M | No. Events / Yr | 82 | $62,938 | 50 | 14.484 | $911,573 |
| | | Const Cost ($) | $5,023,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 75 | $14,651 | 20 | 10.910 | $159,842 |
| | Odor Control O&M | Capacity (cfm) | 15,700 | $54,950 | 20 | 10.910 | $599,501 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,478 |
| | | | **Total Annual O&M** | **$156,000** | | **Total PW O&M** | **$1,938,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 74.74 | $335,603 | 20 | 10.910 | $3,661,404 |
| | Sed. Basin O&M | Flow Rate (mgd) | 74.74 | $8,409 | 50 | 14.484 | $121,788 |
| | Screening O&M | Flow Rate (mgd) | 74.74 | $14,651 | 20 | 10.910 | $159,842 |
| | Disinfection O&M | Flow Rate (mgd) | 74.74 | $222,674 | 20 | 10.910 | $2,429,358 |
| | Odor Control O&M | Capacity (cfm) | 11,450.00 | $40,075 | 20 | 10.910 | $437,216 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $60,667 |
| | | | **Total Annual O&M** | **$622,000** | | **Total PW O&M** | **$6,870,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 82.22 | $357,668 | 20 | 10.910 | $3,902,133 |
| | HREP O&M | Flow Rate (mgd) | 74.74 | $294,481 | 20 | 10.910 | $3,212,771 |
| | Screening O&M | Flow Rate (mgd) | 74.74 | $14,651 | 20 | 10.910 | $159,842 |
| | Disinfection O&M | Flow Rate (mgd) | 82.22 | $235,986 | 20 | 10.910 | $2,574,589 |
| | Odor Control O&M | Capacity (cfm) | 1,100.00 | $3,850 | 20 | 10.910 | $42,003 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $99,753 |
| | | | **Total Annual O&M** | **$907,000** | | **Total PW O&M** | **$9,991,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 82.22 | $357,668 | 20 | 10.910 | $3,902,133 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 74.74 | $8,409 | 20 | 10.910 | $91,739 |
| | Screening O&M | Flow Rate (mgd) | 74.74 | $14,651 | 20 | 10.910 | $159,842 |
| | Disinfection O&M | Flow Rate (mgd) | 82.22 | $235,986 | 20 | 10.910 | $2,574,589 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $62,982 |
| | | | **Total Annual O&M** | **$617,000** | | **Total PW O&M** | **$6,791,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 74.74 | $335,603 | 20 | 10.910 | $3,661,404 |
| | Screening O&M | Flow Rate (mgd) | 74.74 | $14,651 | 20 | 10.910 | $159,842 |
| | Disinfection O&M | Flow Rate (mgd) | 74.74 | $222,674 | 20 | 10.910 | $2,429,358 |
| | Odor Control O&M | Capacity (cfm) | 1,160.00 | $4,060 | 20 | 10.910 | $44,294 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $59,263 |
| | | | **Total Annual O&M** | **$577,000** | | **Total PW O&M** | **$6,354,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 39.70 | $219,917 | 20 | 10.910 | $2,399,282 |
| | Tank O&M | No. Events / Yr | 82 | $53,283 | 50 | 14.484 | $771,734 |
| | | Const Cost ($) | $1,161,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 40 | $11,014 | 20 | 10.910 | $120,166 |
| | Odor Control O&M | Capacity (cfm) | 1,440 | $5,040 | 20 | 10.910 | $54,986 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $32,954 |
| | | | **Total Annual O&M** | **$290,000** | | **Total PW O&M** | **$3,379,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.21 | $21,351 | 20 | 10.910 | $232,938 |
| | Tank O&M | No. Events / Yr | 82 | $61,983 | 50 | 14.484 | $897,741 |
| | | Const Cost ($) | $4,641,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 40 | $11,014 | 20 | 10.910 | $120,166 |
| | Odor Control O&M | Capacity (cfm) | 14,350 | $50,225 | 20 | 10.910 | $547,952 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,487 |
| | | | **Total Annual O&M** | **$145,000** | | **Total PW O&M** | **$1,812,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 39.70 | $219,917 | 20 | 10.910 | $2,399,282 |
| | Sed. Basin O&M | Flow Rate (mgd) | 39.70 | $4,467 | 50 | 14.484 | $64,691 |
| | Screening O&M | Flow Rate (mgd) | 39.70 | $11,014 | 20 | 10.910 | $120,166 |
| | Disinfection O&M | Flow Rate (mgd) | 39.70 | $151,456 | 20 | 10.910 | $1,652,374 |
| | Odor Control O&M | Capacity (cfm) | 6,100.00 | $21,350 | 20 | 10.910 | $232,927 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $36,664 |
| | | | **Total Annual O&M** | **$409,000** | | **Total PW O&M** | **$4,506,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 43.67 | $234,376 | 20 | 10.910 | $2,557,030 |
| | HREP O&M | Flow Rate (mgd) | 39.70 | $202,989 | 20 | 10.910 | $2,214,594 |
| | Screening O&M | Flow Rate (mgd) | 39.70 | $11,014 | 20 | 10.910 | $120,166 |
| | Disinfection O&M | Flow Rate (mgd) | 43.67 | $160,510 | 20 | 10.910 | $1,751,156 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $58,513 |
| | | | **Total Annual O&M** | **$611,000** | | **Total PW O&M** | **$6,724,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 43.67 | $234,376 | 20 | 10.910 | $2,557,030 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 39.70 | $4,467 | 20 | 10.910 | $48,730 |
| | Screening O&M | Flow Rate (mgd) | 39.70 | $11,014 | 20 | 10.910 | $120,166 |
| | Disinfection O&M | Flow Rate (mgd) | 43.67 | $160,510 | 20 | 10.910 | $1,751,156 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $37,803 |
| | | | **Total Annual O&M** | **$411,000** | | **Total PW O&M** | **$4,515,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 39.70 | $219,917 | 20 | 10.910 | $2,399,282 |
| | Screening O&M | Flow Rate (mgd) | 39.70 | $11,014 | 20 | 10.910 | $120,166 |
| | Disinfection O&M | Flow Rate (mgd) | 39.70 | $151,456 | 20 | 10.910 | $1,652,374 |
| | Odor Control O&M | Capacity (cfm) | 620.00 | $2,170 | 20 | 10.910 | $23,675 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $35,807 |
| | | | **Total Annual O&M** | **$385,000** | | **Total PW O&M** | **$4,231,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 24.33 | $158,553 | 20 | 10.910 | $1,729,805 |
| | Tank O&M | No. Events / Yr | 82 | $51,988 | 50 | 14.484 | $752,977 |
| | | Const Cost ($) | $643,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 24 | $9,560 | 20 | 10.910 | $104,304 |
| | Odor Control O&M | Capacity (cfm) | 840 | $2,940 | 20 | 10.910 | $32,075 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,253 |
| | | | **Total Annual O&M** | **$224,000** | | **Total PW O&M** | **$2,642,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.70 | $14,863 | 20 | 10.910 | $162,157 |
| | Tank O&M | No. Events / Yr | 82 | $58,083 | 50 | 14.484 | $841,255 |
| | | Const Cost ($) | $3,081,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 24 | $9,560 | 20 | 10.910 | $104,304 |
| | Odor Control O&M | Capacity (cfm) | 8,350 | $29,225 | 20 | 10.910 | $318,843 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,102 |
| | | | **Total Annual O&M** | **$112,000** | | **Total PW O&M** | **$1,436,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 24.33 | $158,553 | 20 | 10.910 | $1,729,805 |
| | Sed. Basin O&M | Flow Rate (mgd) | 24.33 | $2,737 | 50 | 14.484 | $39,644 |
| | Screening O&M | Flow Rate (mgd) | 24.33 | $9,560 | 20 | 10.910 | $104,304 |
| | Disinfection O&M | Flow Rate (mgd) | 24.33 | $112,390 | 20 | 10.910 | $1,226,169 |
| | Odor Control O&M | Capacity (cfm) | 3,800.00 | $13,300 | 20 | 10.910 | $145,102 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,998 |
| | | | **Total Annual O&M** | **$297,000** | | **Total PW O&M** | **$3,271,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 26.76 | $168,978 | 20 | 10.910 | $1,843,536 |
| | HREP O&M | Flow Rate (mgd) | 24.33 | $152,195 | 20 | 10.910 | $1,660,441 |
| | Screening O&M | Flow Rate (mgd) | 24.33 | $9,560 | 20 | 10.910 | $104,304 |
| | Disinfection O&M | Flow Rate (mgd) | 26.76 | $119,109 | 20 | 10.910 | $1,299,472 |
| | Odor Control O&M | Capacity (cfm) | 400.00 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $40,499 |
| | | | **Total Annual O&M** | **$452,000** | | **Total PW O&M** | **$4,964,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 26.76 | $168,978 | 20 | 10.910 | $1,843,536 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 24.33 | $2,737 | 20 | 10.910 | $29,862 |
| | Screening O&M | Flow Rate (mgd) | 24.33 | $9,560 | 20 | 10.910 | $104,304 |
| | Disinfection O&M | Flow Rate (mgd) | 26.76 | $119,109 | 20 | 10.910 | $1,299,472 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,625 |
| | | | **Total Annual O&M** | **$301,000** | | **Total PW O&M** | **$3,304,000** |

| CSO 019M001 - Individual DCs | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 24.33 | $158,553 | 20 | 10.910 | $1,729,805 |
| | Screening O&M | Flow Rate (mgd) | 24.33 | $9,560 | 20 | 10.910 | $104,304 |
| | Disinfection O&M | Flow Rate (mgd) | 24.33 | $112,390 | 20 | 10.910 | $1,226,169 |
| | Odor Control O&M | Capacity (cfm) | 380.00 | $1,330 | 20 | 10.910 | $14,510 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,405 |
| | | | **Total Annual O&M** | **$282,000** | | **Total PW O&M** | **$3,100,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $88.0 | $87,997,000 | $0 |
| 1 | $88.0 | $87,997,000 | $0 |
| 2 | $88.0 | $87,997,000 | $0 |
| 4 | $88.0 | $87,997,000 | $0 |
| 6 | $88.0 | $87,997,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $36.2 | $32,548,000 | $3,629,000 |
| 1 | $23.0 | $20,929,000 | $2,074,000 |
| 2 | $21.9 | $19,938,000 | $1,938,000 |
| 4 | $17.7 | $15,902,000 | $1,812,000 |
| 6 | $12.1 | $10,664,000 | $1,436,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $39.9 | $34,137,000 | $5,714,000 |
| 1 | $30.4 | $25,569,000 | $4,810,000 |
| 2 | $29.7 | $24,948,000 | $4,712,000 |
| 4 | $20.4 | $17,022,000 | $3,379,000 |
| 6 | $14.2 | $11,586,000 | $2,642,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $47.9 | $39,153,000 | $8,746,000 |
| 1 | $33.9 | $27,006,000 | $6,930,000 |
| 2 | $33.3 | $26,539,000 | $6,791,000 |
| 4 | $22.2 | $17,671,000 | $4,515,000 |
| 6 | $15.6 | $12,286,000 | $3,304,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $65.1 | $53,217,000 | $11,895,000 |
| 1 | $52.7 | $42,542,000 | $10,189,000 |
| 2 | $51.6 | $41,629,000 | $9,991,000 |
| 4 | $33.0 | $26,237,000 | $6,724,000 |
| 6 | $22.9 | $17,900,000 | $4,964,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $57.3 | $49,029,000 | $8,280,000 |
| 1 | $49.7 | $42,724,000 | $7,015,000 |
| 2 | $49.1 | $42,266,000 | $6,870,000 |
| 4 | $38.1 | $33,571,000 | $4,506,000 |
| 6 | $31.6 | $28,293,000 | $3,271,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $41.7 | $34,121,000 | $7,603,000 |
| 1 | $34.0 | $27,501,000 | $6,484,000 |
| 2 | $33.4 | $27,026,000 | $6,354,000 |
| 4 | $22.1 | $17,882,000 | $4,231,000 |
| 6 | $15.5 | $12,432,000 | $3,100,000 |

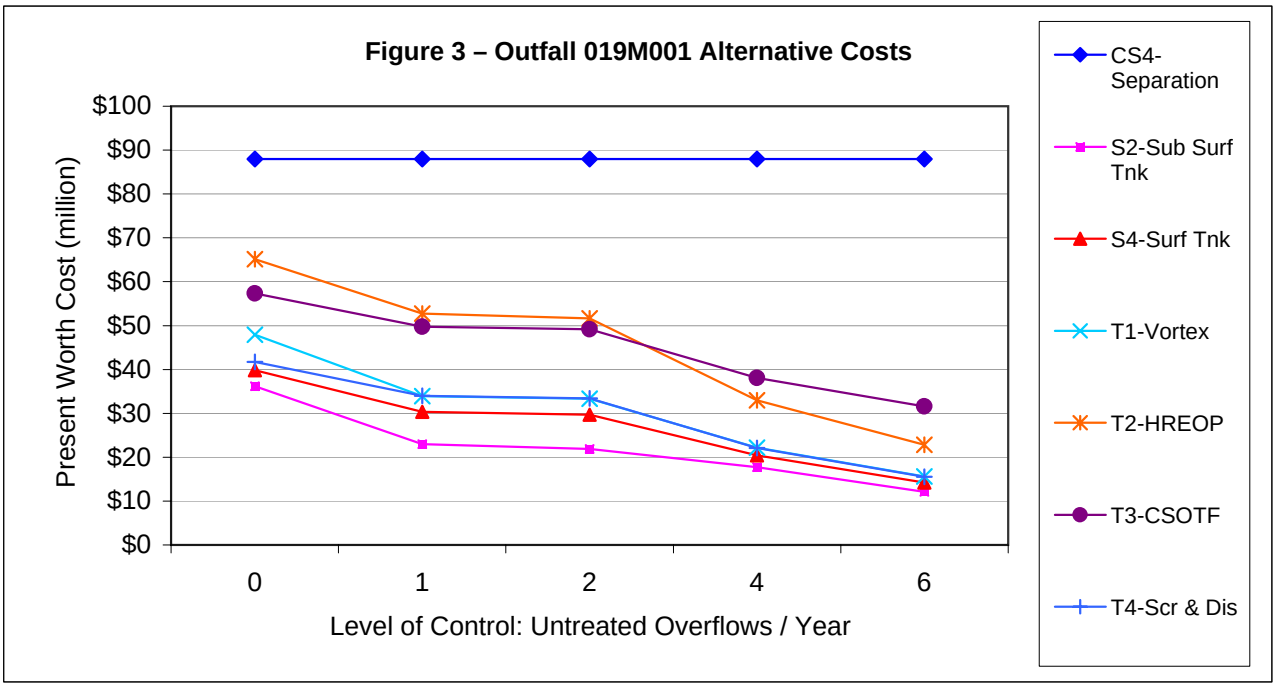
Figure 3 – Outfall 019M001 Alternative Costs
Present Worth Cost (million)
$100
$90
$80
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 019M001 - Individual DCs |
| **Location Name** | Greentree Rd./Wonder St. |
| **Model ID** | McCartney - DCs.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | McCartney Run |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 019M001 |
| **Owner** | PWSA |

**Results Summary**

| | |
|---|---|
| Number of Events: | 82 |
| Peak Volume: | 510,620 $ft^3$ |
| | 3.82 MG |
| Total Volume: | 2,606,130 $ft^3$ |
| | 19.50 MG |
| Peak Rate: | 152.52 cfs |

| | |
|---|---|
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 0:27 | 5620 | 1/5/2005 14:45 | 510620.35 | 3819.696 | 0 | 12.86 | 18 |
| 6/11/2005 17:25 | 65 | 6/11/2005 17:45 | 203696.05 | 1523.748 | 1 | 152.52 | 0 |
| 5/13/2005 22:35 | 2245 | 5/14/2005 16:15 | 178373.42 | 1334.322 | 2 | 71.25 | 3 |
| 7/15/2005 17:30 | 85 | 7/15/2005 18:15 | 170368.75 | 1274.443 | 3 | 119.31 | 1 |
| 8/20/2005 18:15 | 80 | 8/20/2005 19:00 | 161776.52 | 1210.169 | 4 | 115.65 | 2 |
| 1/11/2005 7:55 | 2251 | 1/12/2005 1:30 | 122677.65 | 917.690 | 5 | 8.47 | 24 |
| 11/29/2005 1:45 | 1552 | 11/29/2005 7:00 | 94073.10 | 703.714 | 6 | 10.13 | 21 |
| 11/14/2005 21:45 | 578 | 11/15/2005 3:45 | 92027.74 | 688.414 | 7 | 17.24 | 14 |
| 2/14/2005 4:53 | 1934 | 2/14/2005 19:45 | 77479.55 | 579.586 | 8 | 3.20 | 44 |
| 7/26/2005 19:35 | 55 | 7/26/2005 20:00 | 73588.15 | 550.476 | 9 | 61.43 | 4 |
| 1/3/2005 8:10 | 1788 | 1/3/2005 13:45 | 63287.15 | 473.420 | 10 | 4.03 | 40 |
| 4/1/2005 19:17 | 2345 | 4/2/2005 6:30 | 62343.04 | 466.357 | 11 | 9.73 | 23 |
| 9/29/2005 5:15 | 114 | 9/29/2005 5:45 | 58828.80 | 440.069 | 12 | 50.73 | 5 |
| 7/5/2005 16:15 | 121 | 7/5/2005 16:30 | 56648.66 | 423.760 | 13 | 33.77 | 8 |
| 3/28/2005 8:52 | 1382 | 3/28/2005 10:15 | 54777.44 | 409.763 | 14 | 4.77 | 35 |
| 4/23/2005 3:20 | 94 | 4/23/2005 3:45 | 48154.76 | 360.222 | 15 | 21.88 | 11 |
| 7/21/2005 14:20 | 77 | 7/21/2005 14:45 | 41134.89 | 307.710 | 16 | 36.83 | 7 |
| 10/24/2005 11:42 | 2016 | 10/25/2005 2:15 | 38705.21 | 289.534 | 17 | 4.73 | 36 |
| 8/29/2005 9:10 | 411 | 8/29/2005 9:30 | 38309.61 | 286.575 | 18 | 16.51 | 16 |
| 1/13/2005 22:30 | 1052 | 1/14/2005 2:15 | 35401.55 | 264.821 | 19 | 5.93 | 31 |
| 5/11/2005 22:35 | 105 | 5/11/2005 22:45 | 34091.10 | 255.019 | 20 | 23.90 | 10 |
| 11/9/2005 19:20 | 40 | 11/9/2005 19:45 | 28786.52 | 215.338 | 21 | 20.89 | 12 |
| 5/23/2005 16:15 | 70 | 5/23/2005 16:30 | 28040.07 | 209.754 | 22 | 37.65 | 6 |
| 2/20/2005 15:30 | 1194 | 2/20/2005 20:00 | 22970.30 | 171.829 | 23 | 8.27 | 25 |
| 12/15/2005 9:56 | 1020 | 12/15/2005 14:00 | 22842.61 | 170.874 | 24 | 12.16 | 19 |
| 7/17/2005 16:05 | 49 | 7/17/2005 16:30 | 22126.76 | 165.519 | 25 | 15.89 | 17 |
| 5/28/2005 8:26 | 98 | 5/28/2005 9:15 | 20689.53 | 154.768 | 26 | 6.99 | 29 |
| 2/9/2005 14:51 | 351 | 2/9/2005 16:45 | 16935.81 | 126.688 | 27 | 11.12 | 20 |
| 7/25/2005 13:16 | 29 | 7/25/2005 13:30 | 15620.39 | 116.848 | 28 | 24.91 | 9 |
| 8/27/2005 15:15 | 30 | 8/27/2005 15:30 | 13675.04 | 102.296 | 29 | 16.88 | 15 |
| 10/21/2005 18:41 | 208 | 10/21/2005 19:00 | 13376.96 | 100.066 | 30 | 3.94 | 41 |
| 3/23/2005 11:50 | 160 | 3/23/2005 12:30 | 12346.21 | 92.356 | 31 | 3.77 | 42 |
| 10/7/2005 7:10 | 373 | 10/7/2005 10:45 | 12284.84 | 91.897 | 32 | 4.98 | 34 |



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Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 4/22/2005 15:50 | 318 | 4/22/2005 16:15 | 11667.56 | 87.279 | 33 | 5.03 | 33 |
| 10/22/2005 6:45 | 694 | 10/22/2005 7:00 | 11638.81 | 87.064 | 34 | 3.22 | 43 |
| 4/20/2005 19:20 | 289 | 4/20/2005 21:30 | 10912.94 | 81.634 | 35 | 7.21 | 27 |
| 9/26/2005 6:46 | 198 | 9/26/2005 9:30 | 10337.13 | 77.327 | 36 | 4.62 | 37 |
| 7/12/2005 19:16 | 68 | 7/12/2005 20:00 | 8441.24 | 63.145 | 37 | 6.26 | 30 |
| 6/28/2005 18:05 | 63 | 6/28/2005 18:15 | 8365.44 | 62.578 | 38 | 17.53 | 13 |
| 3/23/2005 2:27 | 194 | 3/23/2005 2:45 | 8122.84 | 60.763 | 39 | 2.49 | 49 |
| 5/28/2005 17:15 | 188 | 5/28/2005 17:30 | 7758.32 | 58.036 | 40 | 4.24 | 39 |
| 8/26/2005 20:50 | 43 | 8/26/2005 21:00 | 7060.29 | 52.815 | 41 | 9.94 | 22 |
| 4/30/2005 4:35 | 150 | 4/30/2005 6:45 | 6827.99 | 51.077 | 42 | 2.23 | 51 |
| 5/20/2005 3:22 | 422 | 5/20/2005 7:35 | 6242.98 | 46.701 | 43 | 1.65 | 56 |
| 11/16/2005 4:05 | 391 | 11/16/2005 4:15 | 6142.02 | 45.945 | 44 | 7.37 | 26 |
| 5/7/2005 12:05 | 99 | 5/7/2005 13:30 | 5741.82 | 42.952 | 45 | 5.87 | 32 |
| 11/9/2005 4:15 | 38 | 11/9/2005 4:30 | 5414.21 | 40.501 | 46 | 7.11 | 28 |
| 2/16/2005 7:10 | 230 | 2/16/2005 8:15 | 4866.69 | 36.405 | 47 | 1.63 | 57 |
| 11/1/2005 14:50 | 187 | 11/1/2005 16:30 | 4774.85 | 35.718 | 48 | 1.74 | 54 |
| 12/25/2005 10:45 | 158 | 12/25/2005 13:00 | 3768.56 | 28.191 | 49 | 1.71 | 55 |
| 3/27/2005 16:50 | 84 | 3/27/2005 17:05 | 3558.41 | 26.619 | 50 | 2.33 | 50 |
| 10/21/2005 7:15 | 83 | 10/21/2005 7:30 | 3015.92 | 22.561 | 51 | 4.40 | 38 |
| 4/27/2005 0:15 | 107 | 4/27/2005 1:45 | 2966.54 | 22.191 | 52 | 2.69 | 47 |
| 6/3/2005 8:01 | 84 | 6/3/2005 9:15 | 2841.34 | 21.255 | 53 | 2.21 | 52 |
| 6/14/2005 19:15 | 38 | 6/14/2005 19:30 | 2717.37 | 20.327 | 54 | 2.96 | 46 |
| 8/8/2005 8:40 | 42 | 8/8/2005 9:00 | 2596.61 | 19.424 | 55 | 2.56 | 48 |
| 9/23/2005 2:50 | 24 | 9/23/2005 3:00 | 1880.95 | 14.070 | 56 | 3.02 | 45 |
| 3/20/2005 3:52 | 285 | 3/20/2005 7:20 | 1304.41 | 9.758 | 57 | 1.15 | 60 |
| 3/7/2005 22:24 | 357 | 3/8/2005 0:25 | 870.45 | 6.511 | 58 | 0.12 | 75 |
| 5/30/2005 19:40 | 28 | 5/30/2005 19:55 | 864.24 | 6.465 | 59 | 1.01 | 62 |
| 1/30/2005 3:12 | 594 | 1/30/2005 11:15 | 782.36 | 5.852 | 60 | 0.35 | 64 |
| 12/26/2005 5:07 | 405 | 12/26/2005 6:15 | 739.85 | 5.534 | 61 | 0.14 | 71 |
| 2/26/2005 11:13 | 177 | 2/26/2005 14:00 | 739.17 | 5.529 | 62 | 0.14 | 74 |
| 4/24/2005 15:06 | 917 | 4/25/2005 0:00 | 724.80 | 5.422 | 63 | 0.14 | 72 |
| 7/27/2005 3:25 | 19 | 7/27/2005 3:35 | 703.83 | 5.265 | 64 | 1.45 | 58 |
| 8/5/2005 10:56 | 50 | 8/5/2005 11:30 | 703.63 | 5.263 | 65 | 0.45 | 63 |
| 3/24/2005 9:35 | 28 | 3/24/2005 9:45 | 685.37 | 5.127 | 66 | 1.34 | 59 |
| 9/16/2005 21:40 | 14 | 9/16/2005 21:45 | 642.83 | 4.809 | 67 | 1.94 | 53 |
| 1/22/2005 10:22 | 89 | 1/22/2005 11:15 | 590.17 | 4.415 | 68 | 0.27 | 65 |
| 11/6/2005 13:45 | 24 | 11/6/2005 14:00 | 552.43 | 4.132 | 69 | 1.14 | 61 |
| 11/24/2005 8:01 | 228 | 11/24/2005 8:15 | 458.73 | 3.432 | 70 | 0.21 | 68 |
| 10/24/2005 1:46 | 105 | 10/24/2005 3:00 | 434.19 | 3.248 | 71 | 0.12 | 76 |
| 11/23/2005 19:46 | 37 | 11/23/2005 20:15 | 365.02 | 2.731 | 72 | 0.26 | 67 |
| 11/8/2005 14:40 | 44 | 11/8/2005 15:15 | 360.50 | 2.697 | 73 | 0.20 | 69 |
| 12/4/2005 6:34 | 496 | 12/4/2005 6:45 | 259.23 | 1.939 | 74 | 0.27 | 66 |
| 6/17/2005 1:26 | 66 | 6/17/2005 1:35 | 182.41 | 1.365 | 75 | 0.11 | 77 |
| 2/8/2005 5:51 | 91 | 2/8/2005 6:00 | 160.37 | 1.200 | 76 | 0.14 | 73 |
| 4/23/2005 11:51 | 18 | 4/23/2005 12:00 | 137.16 | 1.026 | 77 | 0.20 | 70 |
| 8/16/2005 6:47 | 16 | 8/16/2005 7:00 | 55.25 | 0.413 | 78 | 0.07 | 79 |
| 3/11/2005 14:07 | 14 | 3/11/2005 14:15 | 44.72 | 0.335 | 79 | 0.07 | 78 |
| 2/24/2005 21:27 | 9 | 2/24/2005 21:30 | 28.28 | 0.212 | 80 | 0.07 | 80 |
| 4/24/2005 7:27 | 8 | 4/24/2005 7:30 | 20.74 | 0.155 | 81 | 0.05 | 81 |


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# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

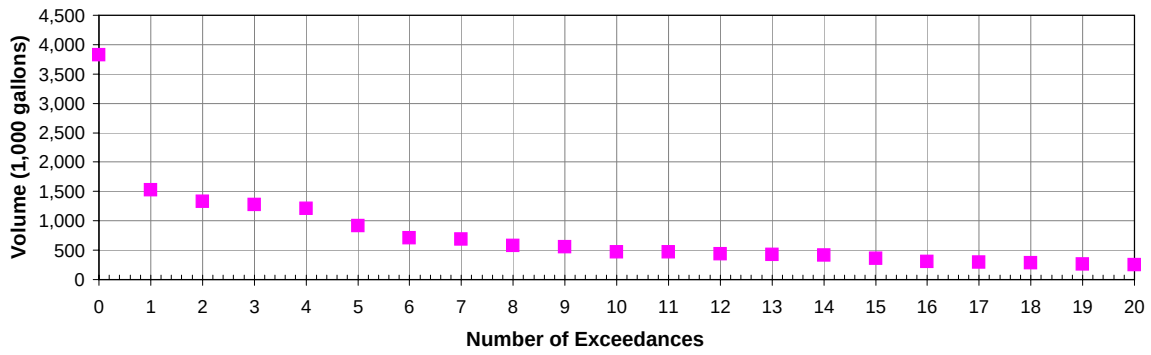
| | |
|---|---|
| **Structure ID** | CSO 019M001 - Individual DCs |
| **Location Name** | Greentree Rd./Wonder St. |
| **Model ID** | McCartney - DCs.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | McCartney Run |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 019M001 |
| **Owner** | PWSA |

**Results Summary**

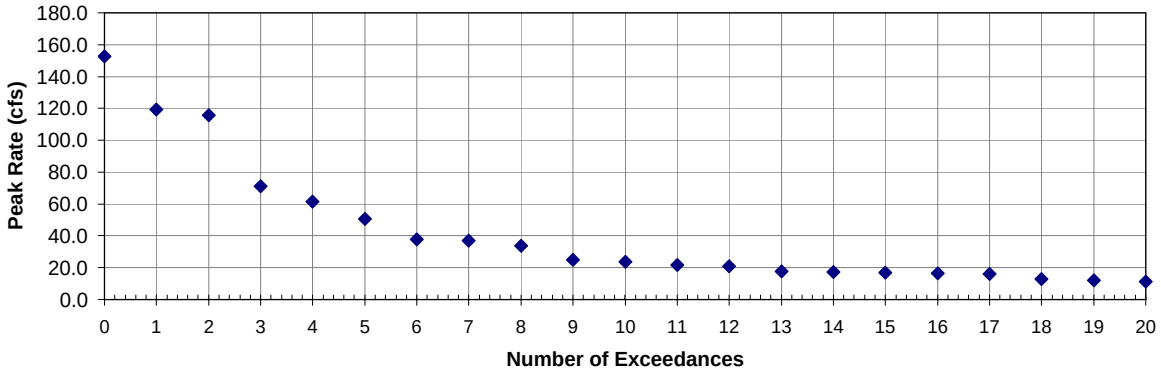
| | |
|---|---|
| Number of Events: | 82 |
| Peak Volume: | 510,620 $ft^3$ |
| | 3.82 MG |
| Total Volume: | 2,606,130 $ft^3$ |
| | 19.50 MG |
| Peak Rate: | 152.52 cfs |

| | |
|---|---|
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) - Systemwide Selection |

### Figure 1 - Outfall 019M001 CSO Volume




### Figure 2 - Outfall 019M001 CSO Peak Flow Rate



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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 4 | 4 | 4 | 4 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.622** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.622** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.605** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.605** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.605** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

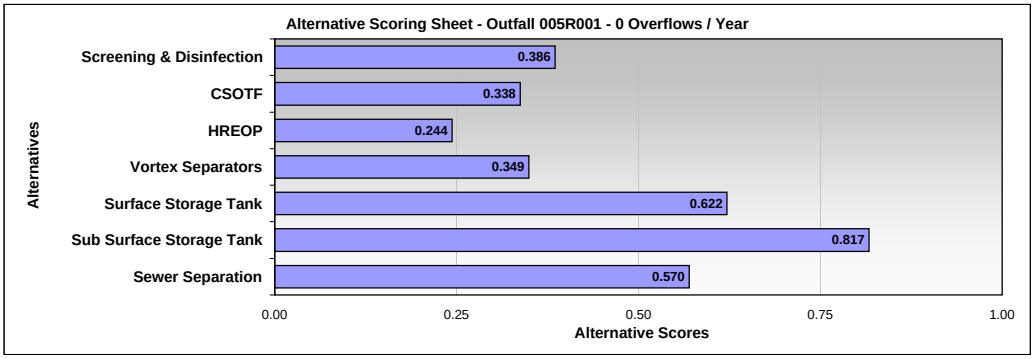
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |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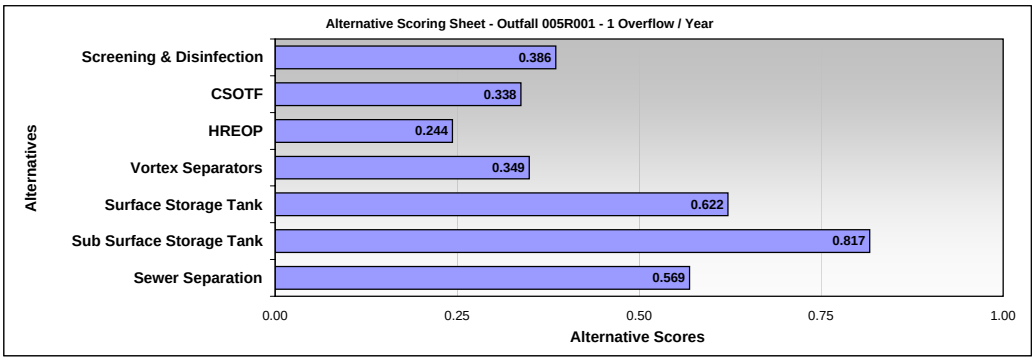
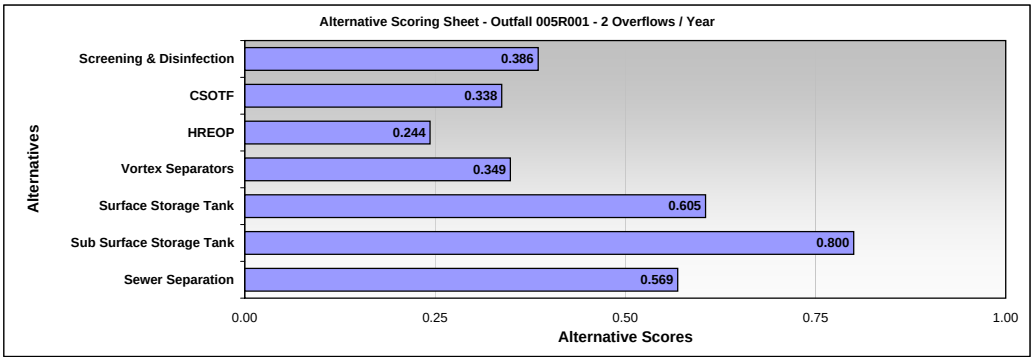
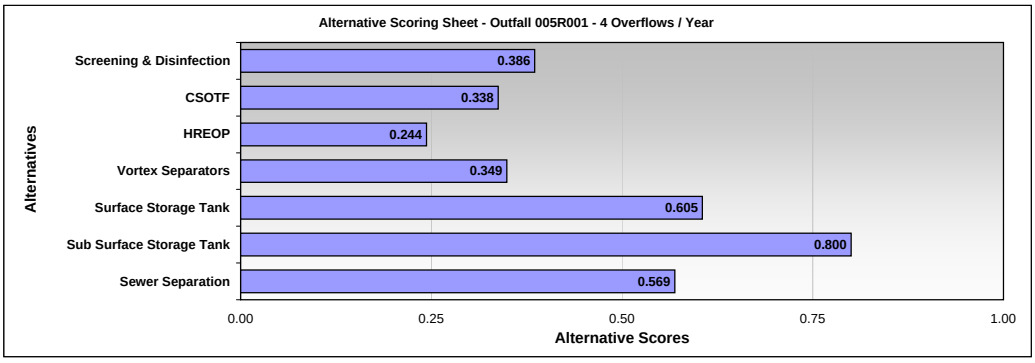
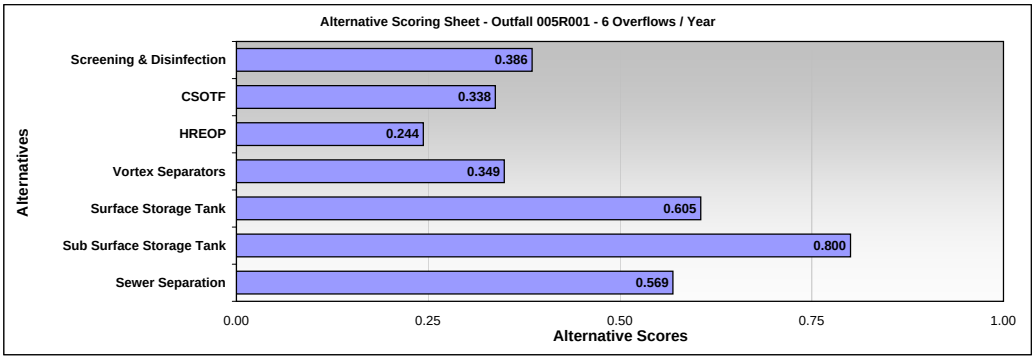
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.622
0.817
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005R001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.622
0.817
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005R001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.605
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005R001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.605
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005R001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.605
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 169 | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **33,800,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 73,616 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **147,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **33,986,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 1.90 | 253,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 2.23 | 298,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 174 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 116 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 2.26 | 302,760 | **Sufficient Volume** |
| Tank Area (SF) | | 20,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,893,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 108.46 | 167.83 | = Peak Rate |
| Force Main Diameter (In) | | 72 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **14,884,000** | **$ 88,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 167.83 | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 447,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,240 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **172,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 108.46 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,434,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 47,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **94,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 22,803,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.90 | | 253,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 2.23 | | 298,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 174 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 116 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 2.26 | | 302,760 | **Sufficient Volume** |
| Tank Area (SF) | 20,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **6,751,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.90 | | 2.93 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 9 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 1,690,000** | | **$ 19,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 167.83 | | | Ref: Technical Parameters |
| Diameter (In) | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 199,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 447,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 22,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 1,045,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 108.46 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 5,434,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 47,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 94,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **15,271,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| **SWIRL CONCENTRATOR / VORTEX SEPARATOR** | | | | |
| **0 Overflows / Year** | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 108.46 | 167.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 12 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **5,290,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 119.31 | 184.61 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 75 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **16,207,000** | **$ 92,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 167.83 | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 346,000 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 17,300 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **855,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 108.46 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,434,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 119.31 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 171 | 82 | |
| Passes / Detention (Min) | | 7 | **15.19** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,179,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 113,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **226,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 30,781,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | | |
| **0 Overflows / Year** | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 108.46 | | 167.83 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 18,100 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 191 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 96 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 1.65 | | 220,032 | |
| **Construction Cost (CSOTF)** | **$** | **16,655,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 108.46 | | 167.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 72 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **14,884,000** | **$** | **88,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 167.83 | | | Ref: CSO Statistics |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 330,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 16,500 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **824,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 108.46 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,434,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 108.46 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 163 | | 78 | |
| Passes / Detention (Min) | | 7 | | **15.15** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **2,070,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 49,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **98,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **40,291,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 108.46 | | 167.83 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,280 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 52 | | **OK** | Input by Engineer |
| Width (Ft) | | 26 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **19,298,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 119.31 | | 184.61 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 75 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **16,207,000** | **$** | **92,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 167.83 | | | Ref: Technical Parameters |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 32,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 1,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **132,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 108.46 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,434,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 119.31 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 171 | | 82 | Input by Engineer |
| Passes / Detention (Min) | | 7 | | **15.19** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,179,000 | $ | 2,694,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,873,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 72,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **144,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **46,418,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 253,374 | CF |
| | 1.90 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 167.83 | CFS |
| | 108.46 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 108.46 | | 167.83 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **5,434,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 108.46 | | 167.83 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 72 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **14,884,000** | **$** | **88,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 167.83 | | | Ref: CSO Statistics |
| Diameter (In) | | 90 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **199,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 33,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 1,680 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **137,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 108.46 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 163 | | 78 | |
| Passes / Detention (Min) | | 7 | | **15.15** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 2,070,000 | $ | 2,508,000 | |
| **Construction Cost (Disinfection)** | **$** | **4,578,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 34,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **68,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **25,427,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 169 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **33,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 73,616 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **147,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **33,986,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.45 | | 60,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.53 | | 71,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 85 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 57 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.54 | | 72,675 | **Sufficient Volume** |
| Tank Area (SF) | 5,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **396,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 41.24 | | 63.81 | = Peak Rate |
| Force Main Diameter (In) | 44 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **6,683,000** | **$** | **53,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 63.81 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 107,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 540 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **56,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 41.24 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,322,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 26,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **52,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **9,726,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.45 | | 60,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.53 | | 71,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 85 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 57 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.54 | | 72,675 | **Sufficient Volume** |
| Tank Area (SF) | 5,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,305,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.45 | | 0.70 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 5 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **668,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 63.81 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 107,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 5,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **341,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 41.24 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,322,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 26,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **52,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,867,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 41.24 | | 63.81 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 45.37 | | 70.20 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 46 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **7,186,000** | **$** | **55,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 63.81 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 41.24 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,322,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 45.37 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 106 | | 51 | |
| Passes | | 5 | | **15.40** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,205,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 43,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **86,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **11,278,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 1 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 41.24 | 63.81 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 6,900 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 118 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 59 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.62 | 83,544 | |
| **Construction Cost (CSOTF)** | **$** | **16,379,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 41.24 | 63.81 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 44 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,683,000** | **$ 53,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 63.81 | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 125,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 6,250 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **385,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 41.24 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,322,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 41.24 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 101 | 48 | |
| Passes | | 3 | **15.19** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,135,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 22,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **44,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **27,165,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 41.24 | | 63.81 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 490 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 32 | | **OK** | Input by Engineer |
| Width (Ft) | | 16 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **7,805,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 45.37 | | 70.20 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 46 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **7,186,000** | **$** | **55,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 63.81 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 41.24 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,322,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 45.37 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 106 | | 51 | Input by Engineer |
| Passes | | 5 | | **15.40** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,205,000 | $ | 1,245,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,450,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 41,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **82,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **20,125,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 60,371 | CF |
| | 0.45 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 63.81 | CFS |
| | 41.24 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 41.24 | | 63.81 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,322,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 41.24 | | 63.81 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 44 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,683,000** | **$** | **53,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 63.81 | | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 640 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **65,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 41.24 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 101 | | 48 | |
| Passes | | 3 | | **15.19** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,135,000 | $ | 1,009,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,144,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 27,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **11,485,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 169 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **33,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 73,616 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **147,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **33,986,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.34 | | 45,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.40 | | 53,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 74 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 50 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.42 | | 55,500 | **Sufficient Volume** |
| Tank Area (SF) | 4,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **288,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 38.49 | | 59.56 | = Peak Rate |
| Force Main Diameter (In) | 43 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **6,348,000** | **$** | **52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 59.56 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 80,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 400 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **45,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 38.49 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,195,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **9,140,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.34 | | 45,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.40 | | 53,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 74 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 50 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.42 | | 55,500 | **Sufficient Volume** |
| Tank Area (SF) | 4,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,953,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.34 | | 0.52 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **571,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 59.56 | | | Ref: Technical Parameters |
| Diameter (In) | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 80,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 4,000 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **271,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 38.49 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **2,195,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,216,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 2 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 38.49 | 59.56 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 42.34 | 65.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 45 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,818,000** | **$ 54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 59.56 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 38.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,195,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 42.34 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 102 | 49 | |
| Passes | | 3 | **15.26** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,154,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 40,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **80,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 10,725,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 38.49 | 59.56 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 6,500 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 115 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 58 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.60 | 80,040 | |
| **Construction Cost (CSOTF)** | **$** | **16,377,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 38.49 | 59.56 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 43 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,348,000** | **$ 52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 59.56 | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 120,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 6,000 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **373,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 38.49 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,195,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 38.49 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 98 | 47 | |
| Passes | | 3 | **15.47** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,087,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 21,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **42,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 26,638,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 38.49 | | 59.56 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 460 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 31 | | **OK** | Input by Engineer |
| Width (Ft) | | 16 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **7,355,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 42.34 | | 65.52 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 45 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,818,000** | **$** | **54,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 59.56 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 12,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 38.49 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,195,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 42.34 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 102 | | 49 | Input by Engineer |
| Passes | | 3 | | **15.26** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,154,000 | $ | 1,029,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,183,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 40,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **80,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **18,910,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 45,099 | CF |
| | 0.34 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 59.56 | CFS |
| | 38.49 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 38.49 | | 59.56 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **2,195,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 38.49 | | 59.56 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 43 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **6,348,000** | **$** | **52,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 59.56 | | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 11,900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **61,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 38.49 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 98 | | 47 | |
| Passes | | 3 | | **15.47** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,087,000 | $ | 972,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,059,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 27,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **10,933,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 169 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **33,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 73,616 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **147,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 33,986,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 27,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.24 | | 32,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 58 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 39 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.25 | | 33,930 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **163,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 22.75 | | 35.20 | = Peak Rate |
| Force Main Diameter (In) | 33 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **4,427,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 35.20 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 48,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 240 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **30,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 22.75 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,466,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **6,294,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.20 | | 27,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.24 | | 32,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 58 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 39 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.25 | | 33,930 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,531,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.20 | | 0.31 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **455,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 35.20 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 48,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **182,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 22.75 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,466,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,815,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 22.75 | | 35.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.02 | | 38.72 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,705,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 22.75 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,466,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 25.02 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 79 | | 38 | |
| Passes | | 3 | | **15.51** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **842,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 24,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,486,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| **SEDIMENTATION BASIN (CSOTF)** | | | | |
| **4 Overflows / Year** | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 22.75 | | 35.20 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 3,800 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 88 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 44 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.35 | | 46,464 | |
| **Construction Cost (CSOTF) $** | **16,371,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 22.75 | | 35.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 33 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **4,427,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 35.20 | | | Ref: CSO Statistics |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 70,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,500 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **244,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 22.75 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,466,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 22.75 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 75 | | 36 | |
| Passes | 3 | | **15.34** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **798,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 14,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **28,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **23,498,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 22.75 | | 35.20 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 270 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 24 | | **OK** | Input by Engineer |
| Width (Ft) | | 12 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **4,802,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.02 | | 38.72 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,705,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.20 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **40,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 22.75 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,466,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 25.02 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 79 | | 38 | Input by Engineer |
| Passes | | 3 | | **15.51** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 842,000 | $ | 725,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,567,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 32,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **64,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **12,809,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 26,781 | CF |
| | 0.20 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 35.20 | CFS |
| | 22.75 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 22.75 | | 35.20 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,466,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 22.75 | | 35.20 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 33 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,427,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.20 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **40,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 22.75 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 75 | | 36 | |
| Passes | | 3 | | **15.34** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 798,000 | $ | 676,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,474,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **7,621,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 0 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 169 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **33,800,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 73,616 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **147,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **33,986,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.12 | | 16,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.14 | | 19,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 45 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 30 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.15 | | 20,250 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **92,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 11.77 | | 18.22 | = Peak Rate |
| Force Main Diameter (In) | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,955,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 18.22 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 29,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **21,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 11.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **957,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,201,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.12 | | 16,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.14 | | 19,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 45 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 30 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.15 | | 20,250 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,278,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.12 | | 0.18 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 8.4 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **385,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 18.22 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 29,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **122,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 11.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **957,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,899,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.77 | | 18.22 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 12.95 | | 20.04 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,231,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.22 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 11.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **957,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 12.95 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 57 | | 27 | |
| Passes | | 3 | | **15.36** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **606,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 12,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **24,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,213,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.77 | | 18.22 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,000 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 64 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 32 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.18 | | 24,576 | |
| **Construction Cost (CSOTF)** | **$** | **16,380,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 11.77 | | 18.22 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,955,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.22 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 37,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **148,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 11.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **957,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 11.77 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 54 | | 26 | |
| Passes | | 3 | | **15.42** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **582,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 10,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **21,176,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 11.77 | | 18.22 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 140 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 18 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,052,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 12.95 | | 20.04 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,231,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.22 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 11.77 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **957,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 12.95 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 57 | | 27 | Input by Engineer |
| Passes | | 3 | | **15.36** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 606,000 | $ | 479,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,085,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 27,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,540,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 34 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 15,778 | CF |
| | 0.12 | MG |
| Total Volume | 601,691 | CF |
| | 4.50 | MG |
| Peak Rate | 18.22 | CFS |
| | 11.77 | MGD |

| Capital Costs - 005R001 / Sewershed CSO 005R001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 11.77 | | 18.22 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **957,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 11.77 | | 18.22 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,955,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.22 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 180 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **24,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 11.77 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 54 | | 26 | |
| Passes | | 3 | | **15.42** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 582,000 | $ | 454,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,036,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **5,154,000** | | | |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 108.46 | $430,384 | 20 | 10.910 | $4,695,464 |
| | Tank O&M | No. Events / Yr | 34 | $25,622 | 50 | 14.484 | $371,100 |
| | | Const Cost ($) | $1,893,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 108 | $18,573 | 20 | 10.910 | $202,635 |
| | Odor Control O&M | Capacity (cfm) | 2,240 | $7,840 | 20 | 10.910 | $85,534 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $75,975 |
| | | | **Total Annual O&M** | **$483,000** | | **Total PW O&M** | **$5,431,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.90 | $28,813 | 20 | 10.910 | $314,353 |
| | Tank O&M | No. Events / Yr | 34 | $37,767 | 50 | 14.484 | $547,003 |
| | | Const Cost ($) | $6,751,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 108 | $18,573 | 20 | 10.910 | $202,635 |
| | Odor Control O&M | Capacity (cfm) | 22,350 | $78,225 | 20 | 10.910 | $853,430 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,518 |
| | | | **Total Annual O&M** | **$164,000** | | **Total PW O&M** | **$1,942,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 108.46 | $430,384 | 20 | 10.910 | $4,695,464 |
| | Sed. Basin O&M | Flow Rate (mgd) | 108.46 | $12,202 | 50 | 14.484 | $176,728 |
| | Screening O&M | Flow Rate (mgd) | 108.46 | $18,573 | 20 | 10.910 | $202,635 |
| | Disinfection O&M | Flow Rate (mgd) | 108.46 | $279,368 | 20 | 10.910 | $3,047,883 |
| | Odor Control O&M | Capacity (cfm) | 16,500.00 | $57,750 | 20 | 10.910 | $630,049 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $83,379 |
| | | | **Total Annual O&M** | **$799,000** | | **Total PW O&M** | **$8,836,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 119.31 | $458,681 | 20 | 10.910 | $5,004,180 |
| | HREP O&M | Flow Rate (mgd) | 108.46 | $366,566 | 20 | 10.910 | $3,999,214 |
| | Screening O&M | Flow Rate (mgd) | 108.46 | $18,573 | 20 | 10.910 | $202,635 |
| | Disinfection O&M | Flow Rate (mgd) | 119.31 | $296,069 | 20 | 10.910 | $3,230,090 |
| | Odor Control O&M | Capacity (cfm) | 1,600.00 | $5,600 | 20 | 10.910 | $61,096 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $139,682 |
| | | | **Total Annual O&M** | **$1,146,000** | | **Total PW O&M** | **$12,637,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 119.31 | $458,681 | 20 | 10.910 | $5,004,180 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 108.46 | $12,202 | 20 | 10.910 | $133,122 |
| | Screening O&M | Flow Rate (mgd) | 108.46 | $18,573 | 20 | 10.910 | $202,635 |
| | Disinfection O&M | Flow Rate (mgd) | 119.31 | $296,069 | 20 | 10.910 | $3,230,090 |
| | Odor Control O&M | Capacity (cfm) | 17,300.00 | $60,550 | 20 | 10.910 | $660,597 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $96,352 |
| | | | **Total Annual O&M** | **$847,000** | | **Total PW O&M** | **$9,327,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 108.46 | $430,384 | 20 | 10.910 | $4,695,464 |
| | Screening O&M | Flow Rate (mgd) | 108.46 | $18,573 | 20 | 10.910 | $202,635 |
| | Disinfection O&M | Flow Rate (mgd) | 108.46 | $279,368 | 20 | 10.910 | $3,047,883 |
| | Odor Control O&M | Capacity (cfm) | 1,680.00 | $5,880 | 20 | 10.910 | $64,150 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $81,510 |
| | | | **Total Annual O&M** | **$735,000** | | **Total PW O&M** | **$8,092,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 41.24 | $225,575 | 20 | 10.910 | $2,461,006 |
| | Tank O&M | No. Events / Yr | 34 | $21,880 | 50 | 14.484 | $316,895 |
| | | Const Cost ($) | $396,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 41 | $11,165 | 20 | 10.910 | $121,805 |
| | Odor Control O&M | Capacity (cfm) | 540 | $1,890 | 20 | 10.910 | $20,620 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $33,735 |
| | | | **Total Annual O&M** | **$261,000** | | **Total PW O&M** | **$2,954,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.45 | $11,051 | 20 | 10.910 | $120,570 |
| | Tank O&M | No. Events / Yr | 34 | $26,652 | 50 | 14.484 | $386,018 |
| | | Const Cost ($) | $2,305,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 41 | $11,165 | 20 | 10.910 | $121,805 |
| | Odor Control O&M | Capacity (cfm) | 5,350 | $18,725 | 20 | 10.910 | $204,289 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,969 |
| | | | **Total Annual O&M** | **$68,000** | | **Total PW O&M** | **$843,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 41.24 | $225,575 | 20 | 10.910 | $2,461,006 |
| | Sed. Basin O&M | Flow Rate (mgd) | 41.24 | $4,640 | 50 | 14.484 | $67,198 |
| | Screening O&M | Flow Rate (mgd) | 41.24 | $11,165 | 20 | 10.910 | $121,805 |
| | Disinfection O&M | Flow Rate (mgd) | 41.24 | $155,005 | 20 | 10.910 | $1,691,092 |
| | Odor Control O&M | Capacity (cfm) | 6,250.00 | $21,875 | 20 | 10.910 | $238,655 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $37,717 |
| | | | **Total Annual O&M** | **$419,000** | | **Total PW O&M** | **$4,617,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 45.37 | $240,406 | 20 | 10.910 | $2,622,812 |
| | HREP O&M | Flow Rate (mgd) | 41.24 | $207,578 | 20 | 10.910 | $2,264,668 |
| | Screening O&M | Flow Rate (mgd) | 41.24 | $11,165 | 20 | 10.910 | $121,805 |
| | Disinfection O&M | Flow Rate (mgd) | 45.37 | $164,271 | 20 | 10.910 | $1,792,189 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $60,308 |
| | | | **Total Annual O&M** | **$626,000** | | **Total PW O&M** | **$6,885,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 45.37 | $240,406 | 20 | 10.910 | $2,622,812 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 41.24 | $4,640 | 20 | 10.910 | $50,618 |
| | Screening O&M | Flow Rate (mgd) | 41.24 | $11,165 | 20 | 10.910 | $121,805 |
| | Disinfection O&M | Flow Rate (mgd) | 45.37 | $164,271 | 20 | 10.910 | $1,792,189 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $38,912 |
| | | | **Total Annual O&M** | **$421,000** | | **Total PW O&M** | **$4,626,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 41.24 | $225,575 | 20 | 10.910 | $2,461,006 |
| | Screening O&M | Flow Rate (mgd) | 41.24 | $11,165 | 20 | 10.910 | $121,805 |
| | Disinfection O&M | Flow Rate (mgd) | 41.24 | $155,005 | 20 | 10.910 | $1,691,092 |
| | Odor Control O&M | Capacity (cfm) | 640.00 | $2,240 | 20 | 10.910 | $24,438 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $36,846 |
| | | | **Total Annual O&M** | **$394,000** | | **Total PW O&M** | **$4,335,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 38.49 | $215,422 | 20 | 10.910 | $2,350,241 |
| | Tank O&M | No. Events / Yr | 34 | $21,610 | 50 | 14.484 | $312,985 |
| | | Const Cost ($) | $288,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 38 | $10,897 | 20 | 10.910 | $118,885 |
| | Odor Control O&M | Capacity (cfm) | 400 | $1,400 | 20 | 10.910 | $15,274 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $31,993 |
| | | | **Total Annual O&M** | **$250,000** | | **Total PW O&M** | **$2,829,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.34 | $9,095 | 20 | 10.910 | $99,223 |
| | Tank O&M | No. Events / Yr | 34 | $25,772 | 50 | 14.484 | $373,273 |
| | | Const Cost ($) | $1,953,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 38 | $10,897 | 20 | 10.910 | $118,885 |
| | Odor Control O&M | Capacity (cfm) | 4,000 | $14,000 | 20 | 10.910 | $152,739 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $9,037 |
| | | | **Total Annual O&M** | **$60,000** | | **Total PW O&M** | **$753,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 38.49 | $215,422 | 20 | 10.910 | $2,350,241 |
| | Sed. Basin O&M | Flow Rate (mgd) | 38.49 | $4,331 | 50 | 14.484 | $62,722 |
| | Screening O&M | Flow Rate (mgd) | 38.49 | $10,897 | 20 | 10.910 | $118,885 |
| | Disinfection O&M | Flow Rate (mgd) | 38.49 | $148,630 | 20 | 10.910 | $1,621,549 |
| | Odor Control O&M | Capacity (cfm) | 6,000.00 | $21,000 | 20 | 10.910 | $229,109 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $35,841 |
| | | | **Total Annual O&M** | **$401,000** | | **Total PW O&M** | **$4,418,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 42.34 | $229,586 | 20 | 10.910 | $2,504,764 |
| | HREP O&M | Flow Rate (mgd) | 38.49 | $199,332 | 20 | 10.910 | $2,174,699 |
| | Screening O&M | Flow Rate (mgd) | 38.49 | $10,897 | 20 | 10.910 | $118,885 |
| | Disinfection O&M | Flow Rate (mgd) | 42.34 | $157,516 | 20 | 10.910 | $1,718,488 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $57,098 |
| | | | **Total Annual O&M** | **$600,000** | | **Total PW O&M** | **$6,597,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 42.34 | $229,586 | 20 | 10.910 | $2,504,764 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 38.49 | $4,331 | 20 | 10.910 | $47,246 |
| | Screening O&M | Flow Rate (mgd) | 38.49 | $10,897 | 20 | 10.910 | $118,885 |
| | Disinfection O&M | Flow Rate (mgd) | 42.34 | $157,516 | 20 | 10.910 | $1,718,488 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $36,927 |
| | | | **Total Annual O&M** | **$403,000** | | **Total PW O&M** | **$4,426,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 38.49 | $215,422 | 20 | 10.910 | $2,350,241 |
| | Screening O&M | Flow Rate (mgd) | 38.49 | $10,897 | 20 | 10.910 | $118,885 |
| | Disinfection O&M | Flow Rate (mgd) | 38.49 | $148,630 | 20 | 10.910 | $1,621,549 |
| | Odor Control O&M | Capacity (cfm) | 600.00 | $2,100 | 20 | 10.910 | $22,911 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $34,993 |
| | | | **Total Annual O&M** | **$378,000** | | **Total PW O&M** | **$4,149,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 22.75 | $151,592 | 20 | 10.910 | $1,653,863 |
| | Tank O&M | No. Events / Yr | 34 | $21,297 | 50 | 14.484 | $308,459 |
| | | Const Cost ($) | $163,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 23 | $9,416 | 20 | 10.910 | $102,725 |
| | Odor Control O&M | Capacity (cfm) | 240 | $840 | 20 | 10.910 | $9,164 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,131 |
| | | | **Total Annual O&M** | **$184,000** | | **Total PW O&M** | **$2,096,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.20 | $6,421 | 20 | 10.910 | $70,047 |
| | Tank O&M | No. Events / Yr | 34 | $24,717 | 50 | 14.484 | $357,992 |
| | | Const Cost ($) | $1,531,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 23 | $9,416 | 20 | 10.910 | $102,725 |
| | Odor Control O&M | Capacity (cfm) | 2,400 | $8,400 | 20 | 10.910 | $91,643 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,339 |
| | | | **Total Annual O&M** | **$49,000** | | **Total PW O&M** | **$629,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 22.75 | $151,592 | 20 | 10.910 | $1,653,863 |
| | Sed. Basin O&M | Flow Rate (mgd) | 22.75 | $2,559 | 50 | 14.484 | $37,068 |
| | Screening O&M | Flow Rate (mgd) | 22.75 | $9,416 | 20 | 10.910 | $102,725 |
| | Disinfection O&M | Flow Rate (mgd) | 22.75 | $107,882 | 20 | 10.910 | $1,176,987 |
| | Odor Control O&M | Capacity (cfm) | 3,500.00 | $12,250 | 20 | 10.910 | $133,647 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,884 |
| | | | **Total Annual O&M** | **$284,000** | | **Total PW O&M** | **$3,129,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 25.02 | $161,559 | 20 | 10.910 | $1,762,600 |
| | HREP O&M | Flow Rate (mgd) | 22.75 | $146,298 | 20 | 10.910 | $1,596,101 |
| | Screening O&M | Flow Rate (mgd) | 22.75 | $9,416 | 20 | 10.910 | $102,725 |
| | Disinfection O&M | Flow Rate (mgd) | 25.02 | $114,331 | 20 | 10.910 | $1,247,349 |
| | Odor Control O&M | Capacity (cfm) | 350.00 | $1,225 | 20 | 10.910 | $13,365 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $38,644 |
| | | | **Total Annual O&M** | **$433,000** | | **Total PW O&M** | **$4,761,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 25.02 | $161,559 | 20 | 10.910 | $1,762,600 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 22.75 | $2,559 | 20 | 10.910 | $27,922 |
| | Screening O&M | Flow Rate (mgd) | 22.75 | $9,416 | 20 | 10.910 | $102,725 |
| | Disinfection O&M | Flow Rate (mgd) | 25.02 | $114,331 | 20 | 10.910 | $1,247,349 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,474 |
| | | | **Total Annual O&M** | **$288,000** | | **Total PW O&M** | **$3,166,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 22.75 | $151,592 | 20 | 10.910 | $1,653,863 |
| | Screening O&M | Flow Rate (mgd) | 22.75 | $9,416 | 20 | 10.910 | $102,725 |
| | Disinfection O&M | Flow Rate (mgd) | 22.75 | $107,882 | 20 | 10.910 | $1,176,987 |
| | Odor Control O&M | Capacity (cfm) | 350.00 | $1,225 | 20 | 10.910 | $13,365 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,329 |
| | | | **Total Annual O&M** | **$271,000** | | **Total PW O&M** | **$2,971,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 11.77 | $97,616 | 20 | 10.910 | $1,064,988 |
| | Tank O&M | No. Events / Yr | 34 | $21,120 | 50 | 14.484 | $305,888 |
| | | Const Cost ($) | $92,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,437 | 20 | 10.910 | $92,043 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,717 |
| | | | **Total Annual O&M** | **$128,000** | | **Total PW O&M** | **$1,483,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.12 | $4,509 | 20 | 10.910 | $49,191 |
| | Tank O&M | No. Events / Yr | 34 | $24,085 | 50 | 14.484 | $348,832 |
| | | Const Cost ($) | $1,278,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,437 | 20 | 10.910 | $92,043 |
| | Odor Control O&M | Capacity (cfm) | 1,450 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,506 |
| | | | **Total Annual O&M** | **$43,000** | | **Total PW O&M** | **$550,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 11.77 | $97,616 | 20 | 10.910 | $1,064,988 |
| | Sed. Basin O&M | Flow Rate (mgd) | 11.77 | $1,324 | 50 | 14.484 | $19,181 |
| | Screening O&M | Flow Rate (mgd) | 11.77 | $8,437 | 20 | 10.910 | $92,043 |
| | Disinfection O&M | Flow Rate (mgd) | 11.77 | $72,218 | 20 | 10.910 | $787,897 |
| | Odor Control O&M | Capacity (cfm) | 1,850.00 | $6,475 | 20 | 10.910 | $70,642 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,645 |
| | | | **Total Annual O&M** | **$187,000** | | **Total PW O&M** | **$2,051,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 12.95 | $104,034 | 20 | 10.910 | $1,135,009 |
| | HREP O&M | Flow Rate (mgd) | 11.77 | $99,305 | 20 | 10.910 | $1,083,416 |
| | Screening O&M | Flow Rate (mgd) | 11.77 | $8,437 | 20 | 10.910 | $92,043 |
| | Disinfection O&M | Flow Rate (mgd) | 12.95 | $76,536 | 20 | 10.910 | $834,999 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,806 |
| | | | **Total Annual O&M** | **$290,000** | | **Total PW O&M** | **$3,179,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 12.95 | $104,034 | 20 | 10.910 | $1,135,009 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 11.77 | $1,324 | 20 | 10.910 | $14,449 |
| | Screening O&M | Flow Rate (mgd) | 11.77 | $8,437 | 20 | 10.910 | $92,043 |
| | Disinfection O&M | Flow Rate (mgd) | 12.95 | $76,536 | 20 | 10.910 | $834,999 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,434 |
| | | | **Total Annual O&M** | **$191,000** | | **Total PW O&M** | **$2,094,000** |

| CSO 005R001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 11.77 | $97,616 | 20 | 10.910 | $1,064,988 |
| | Screening O&M | Flow Rate (mgd) | 11.77 | $8,437 | 20 | 10.910 | $92,043 |
| | Disinfection O&M | Flow Rate (mgd) | 11.77 | $72,218 | 20 | 10.910 | $787,897 |
| | Odor Control O&M | Capacity (cfm) | 180.00 | $630 | 20 | 10.910 | $6,873 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,308 |
| | | | **Total Annual O&M** | **$179,000** | | **Total PW O&M** | **$1,968,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $34.0 | $33,986,000 | $0 |
| 1 | $34.0 | $33,986,000 | $0 |
| 2 | $34.0 | $33,986,000 | $0 |
| 4 | $34.0 | $33,986,000 | $0 |
| 6 | $34.0 | $33,986,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $17.2 | $15,271,000 | $1,942,000 |
| 1 | $6.7 | $5,867,000 | $843,000 |
| 2 | $6.0 | $5,216,000 | $753,000 |
| 4 | $4.4 | $3,815,000 | $629,000 |
| 6 | $3.4 | $2,899,000 | $550,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $28.2 | $22,803,000 | $5,431,000 |
| 1 | $12.7 | $9,726,000 | $2,954,000 |
| 2 | $12.0 | $9,140,000 | $2,829,000 |
| 4 | $8.4 | $6,294,000 | $2,096,000 |
| 6 | $5.7 | $4,201,000 | $1,483,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $40.1 | $30,781,000 | $9,327,000 |
| 1 | $15.9 | $11,278,000 | $4,626,000 |
| 2 | $15.2 | $10,725,000 | $4,426,000 |
| 4 | $10.7 | $7,486,000 | $3,166,000 |
| 6 | $7.3 | $5,213,000 | $2,094,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $59.1 | $46,418,000 | $12,637,000 |
| 1 | $27.0 | $20,125,000 | $6,885,000 |
| 2 | $25.5 | $18,910,000 | $6,597,000 |
| 4 | $17.6 | $12,809,000 | $4,761,000 |
| 6 | $11.7 | $8,540,000 | $3,179,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $49.1 | $40,291,000 | $8,836,000 |
| 1 | $31.8 | $27,165,000 | $4,617,000 |
| 2 | $31.1 | $26,638,000 | $4,418,000 |
| 4 | $26.6 | $23,498,000 | $3,129,000 |
| 6 | $23.2 | $21,176,000 | $2,051,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $33.5 | $25,427,000 | $8,092,000 |
| 1 | $15.8 | $11,485,000 | $4,335,000 |
| 2 | $15.1 | $10,933,000 | $4,149,000 |
| 4 | $10.6 | $7,621,000 | $2,971,000 |
| 6 | $7.1 | $5,154,000 | $1,968,000 |

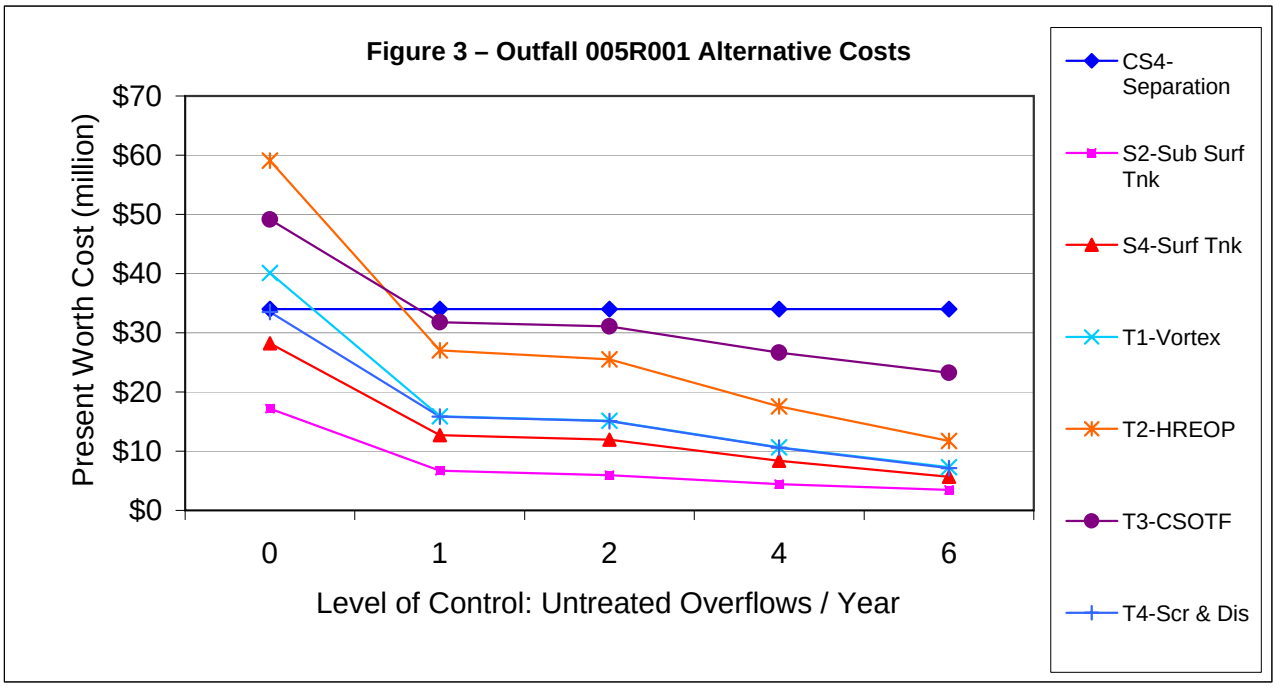


Figure 3 – Outfall 005R001 Alternative Costs
Present Worth Cost (million)
$70
$60
$50
$40
$30
$20
$10
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 005R001 |
| **Location Name** | Saw Mill Run near Woodruff |
| **Model ID** | JCT 005R002.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005R001 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 34 |
| Peak Volume: | 253,374 $ft^3$ |
| | 1.90 MG |
| Total Volume: | 601,691 $ft^3$ |
| | 4.50 MG |
| Peak Rate: | 167.83 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:15 | 70 | 8/20/2005 19:00 | 253373.77 | 1895.363 | 0 | 167.83 | 0 |
| 5/13/2005 22:35 | 124 | 5/14/2005 0:00 | 60371.49 | 451.609 | 1 | 33.67 | 5 |
| 7/26/2005 19:45 | 43 | 7/26/2005 20:20 | 45099.03 | 337.363 | 2 | 59.56 | 2 |
| 7/5/2005 16:20 | 50 | 7/5/2005 17:05 | 32656.30 | 244.285 | 3 | 57.12 | 3 |
| 1/8/2005 5:00 | 55 | 1/8/2005 5:05 | 26780.63 | 200.333 | 4 | 63.81 | 1 |
| 8/29/2005 13:30 | 25 | 8/29/2005 13:35 | 16704.57 | 124.959 | 5 | 35.20 | 4 |
| 7/15/2005 17:41 | 43 | 7/15/2005 18:05 | 15778.11 | 118.028 | 6 | 18.22 | 6 |
| 4/23/2005 3:45 | 55 | 4/23/2005 3:50 | 14632.79 | 109.461 | 7 | 9.98 | 9 |
| 1/5/2005 13:50 | 80 | 1/5/2005 14:45 | 12946.86 | 96.849 | 8 | 3.62 | 23 |
| 9/29/2005 5:30 | 25 | 9/29/2005 5:45 | 11814.54 | 88.379 | 9 | 11.28 | 7 |
| 1/6/2005 3:20 | 470 | 1/6/2005 3:25 | 11718.13 | 87.658 | 10 | 4.54 | 20 |
| 11/14/2005 22:50 | 320 | 11/14/2005 23:00 | 8930.71 | 66.806 | 11 | 3.20 | 26 |
| 7/21/2005 14:25 | 30 | 7/21/2005 14:45 | 7672.92 | 57.397 | 12 | 8.22 | 10 |
| 5/11/2005 22:40 | 90 | 5/11/2005 22:45 | 7065.01 | 52.850 | 13 | 4.79 | 19 |
| 11/9/2005 19:30 | 25 | 11/9/2005 19:45 | 7052.71 | 52.758 | 14 | 7.45 | 11 |
| 5/23/2005 16:20 | 35 | 5/23/2005 16:30 | 6879.42 | 51.461 | 15 | 6.31 | 14 |
| 11/29/2005 6:50 | 50 | 11/29/2005 7:00 | 6651.02 | 49.753 | 16 | 3.36 | 25 |
| 8/27/2005 15:20 | 20 | 8/27/2005 15:25 | 6467.79 | 48.382 | 17 | 11.01 | 8 |
| 2/9/2005 16:30 | 25 | 2/9/2005 16:35 | 5633.08 | 42.138 | 18 | 6.56 | 13 |
| 1/12/2005 1:05 | 40 | 1/12/2005 1:30 | 5467.84 | 40.902 | 19 | 3.54 | 24 |
| 5/14/2005 16:10 | 30 | 5/14/2005 16:15 | 4793.63 | 35.859 | 20 | 4.88 | 18 |
| 7/25/2005 13:20 | 20 | 7/25/2005 13:30 | 4422.91 | 33.086 | 21 | 6.78 | 12 |
| 11/9/2005 4:20 | 20 | 11/9/2005 4:30 | 4149.58 | 31.041 | 22 | 5.88 | 15 |
| 6/11/2005 17:50 | 20 | 6/11/2005 18:00 | 4041.48 | 30.232 | 23 | 5.56 | 17 |
| 9/16/2005 21:35 | 20 | 9/16/2005 21:45 | 3396.51 | 25.408 | 24 | 5.60 | 16 |
| 7/12/2005 19:50 | 22 | 7/12/2005 20:00 | 3351.19 | 25.069 | 25 | 4.28 | 21 |
| 3/28/2005 18:50 | 35 | 3/28/2005 19:00 | 2645.32 | 19.788 | 26 | 2.37 | 30 |
| 1/11/2005 11:20 | 24 | 1/11/2005 11:30 | 2325.36 | 17.395 | 27 | 2.90 | 28 |
| 2/20/2005 19:55 | 49 | 2/20/2005 20:30 | 2301.90 | 17.219 | 28 | 1.73 | 31 |
| 7/17/2005 16:35 | 20 | 7/17/2005 16:45 | 2105.80 | 15.752 | 29 | 2.93 | 27 |
| 1/14/2005 2:05 | 20 | 1/14/2005 2:15 | 1826.27 | 13.661 | 30 | 2.38 | 29 |
| 6/28/2005 18:10 | 15 | 6/28/2005 18:15 | 1793.08 | 13.413 | 31 | 4.03 | 22 |
| 11/16/2005 4:15 | 14 | 11/16/2005 4:20 | 477.88 | 3.575 | 32 | 1.46 | 32 |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/26/2005 21:00 | 12 | 8/26/2005 21:05 | 363.22 | 2.717 | 33 | 1.16 | 33 |

## Region 1

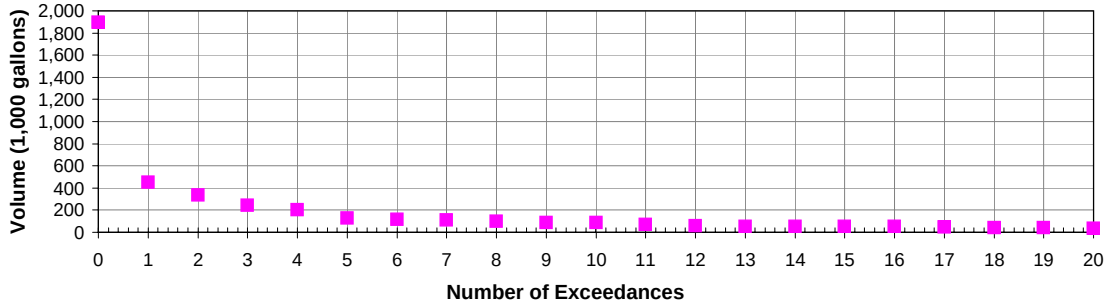
### PWSA CSO DISCHARGES
### for "Typical Year - 2005"
### Base Line Condition

| | |
|---|---|
| **Structure ID** | CSO 005R001 |
| **Location Name** | Saw Mill Run near Woodruff |
| **Model ID** | JCT 005R002.1 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005R001 |
| **Owner** | PWSA |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

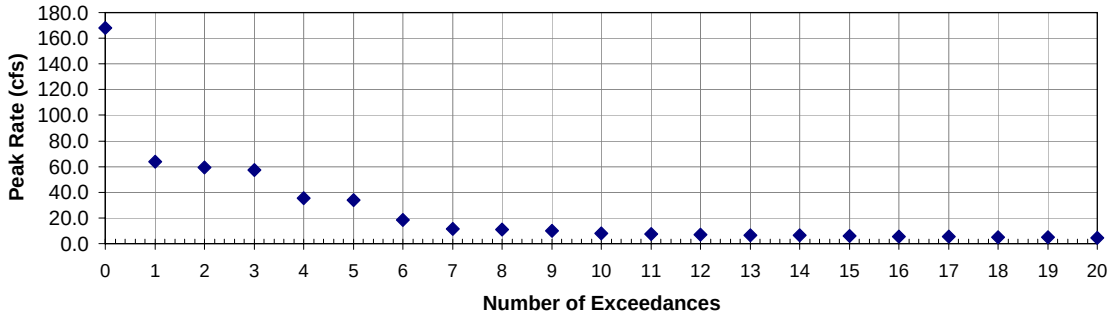
**Results Summary**

| | |
|---|---|
| Number of Events: | 34 |
| Peak Volume: | 253,374 $ft^3$ |
| | 1.90 MG |
| Total Volume: | 601,691 $ft^3$ |
| | 4.50 MG |
| Peak Rate: | 167.83 cfs |

### Figure 1 - Outfall 005R001 CSO Volume




### Figure 2 - Outfall 005R001 CSO Peak Flow Rate



## D.28.1 CSO 005R001 – OLYMPIA, SHALER AND WOODRUFF SEWERSHED – NPDES# 005R001

### Description of Outfall

Outfall 005R001 conveys overflows from the PWSA diversion chamber 005R001 to Saw Mill Run. The outfall is located along Saw Mill Run adjacent to Saw Mill Run Boulevard near Woodruff Street in the City of Pittsburgh. The service area is called the Olympia, Shaler and Woodruff Sewershed and is 422 acres of residential, business and commercial users. The Olympia, Shaler and Woordruff Sewersheds are comprised of approximately 316 manholes and 85,283 linear feet (16.2 miles) of mostly combined sewer up to 48 inches in diameter. The 005R001 sewershed (Woodruff St.) consists of 169 acres, or approximately 40% of the total service area.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 005R001 typically experiences 34 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 005R001 is approximately 1.90 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 005R001 is approximately 167.83 CFS. *Figure 1 – Outfall 005R001 CSO Volume* and *Figure 2 – Outfall 005R001 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

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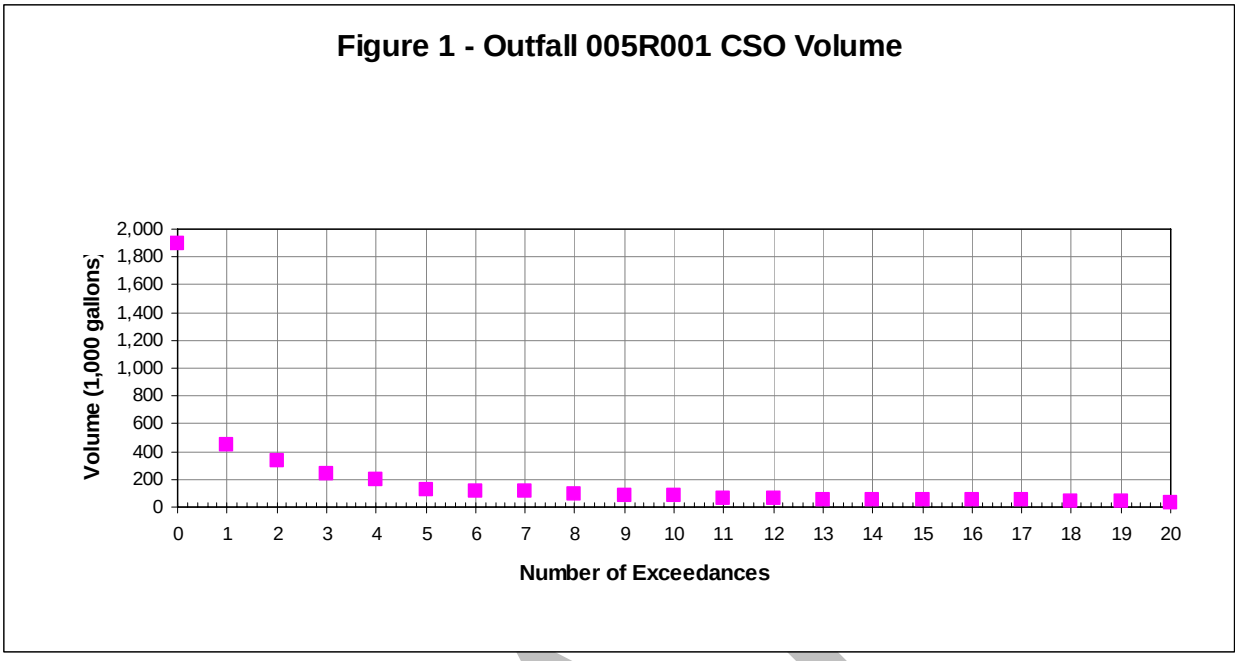
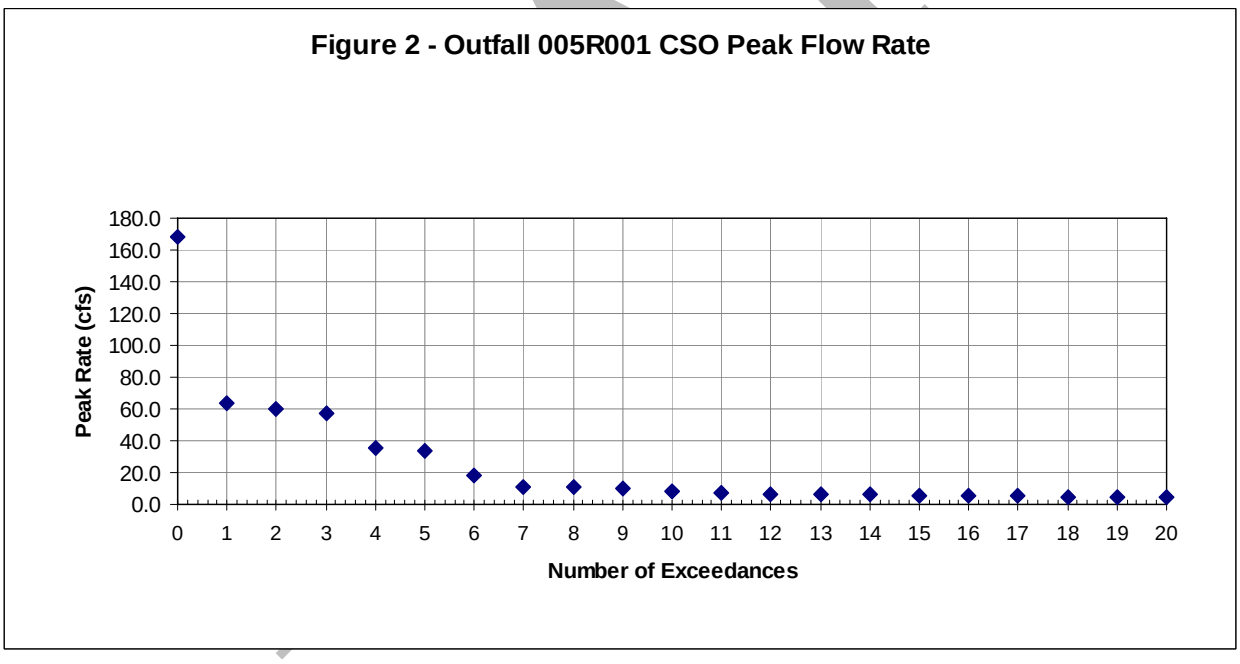
SW-D-0224.pdf




Space appears to be limited for storage or treatment facilities. The outfall is located in a very congested area of the Saw Mill Run area with critical infrastructure and underground utilities, including parallel ALCOSAN interceptors in the vicinity. There is an existing parking area near the salt storage facility that could be procured for a storage and treatment facility. The site is

generally bounded by Saw mill Run Boulevard to the north, steep slopes and Saw Mill Run to the south, a salt storage facility to the east and private development to the west.

## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 005R001. Attachment 2 identifies the alternatives that have been brought forward to be included in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

### *Collection System Control Alternatives*

CS4-005R001: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

### *Storage Alternatives*

S2-005R001: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-005R001: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes.

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Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-005R001: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-005R001: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-005R001: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-005R001: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

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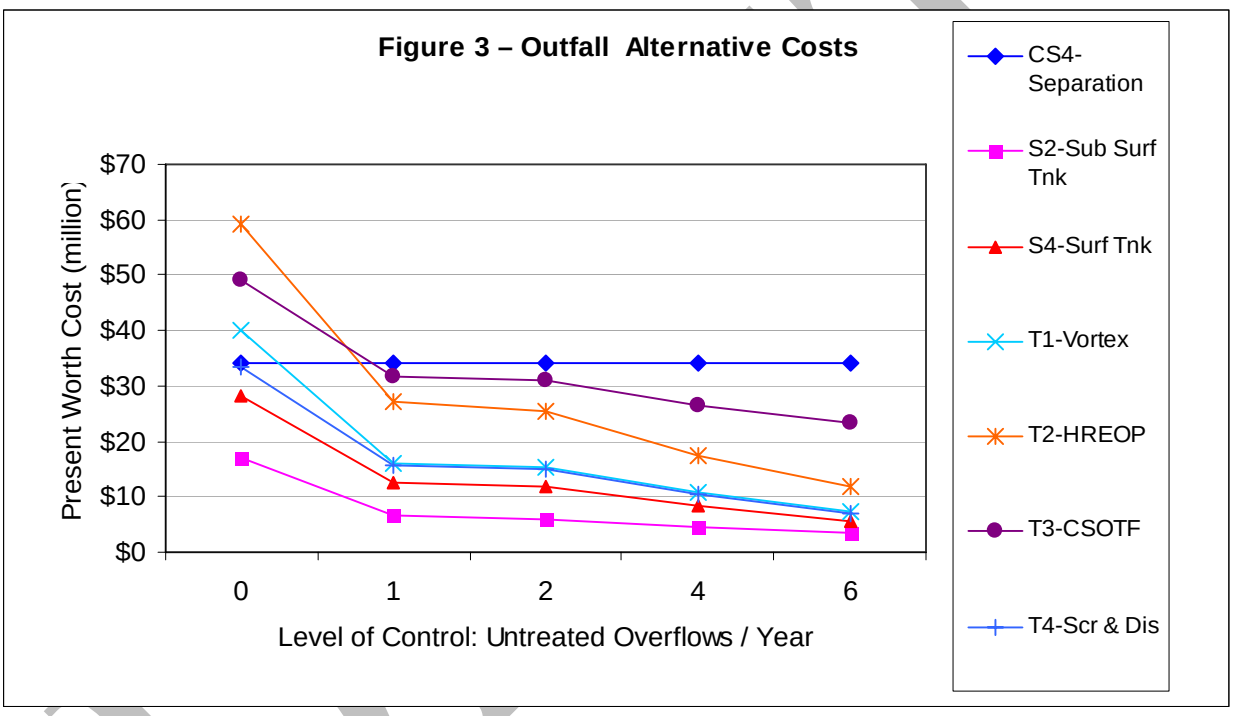
**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 005R001 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.




The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.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**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-005R001: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

Available space does not appear to be available for a sub-surface storage facility at control level 0, but may be available at the other control levels. Significant underground utilities exist near the outfall, which may cause significant impacts to the construction cost of a storage facility.

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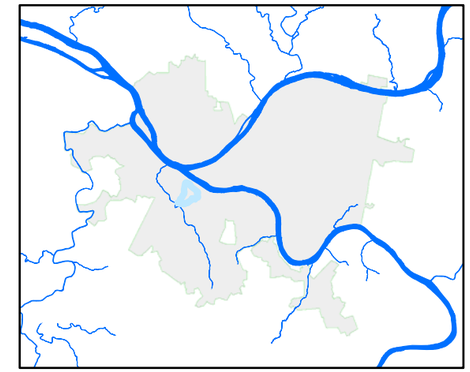

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Structure
- Combined Sewer Outfall

500 0 500 Feet

# Attachment 1
# CSO 005R001
# Tributary Area Map
# Woodruff St. Sewershed

CSO Controls Alternatives

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Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not be evaluated. |
| Inter-basin flow balance / relief | N | A relief sewer will not be evaluated. |
| Sewer separation | Y | Sewer separation within the 169 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will not be evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Other: Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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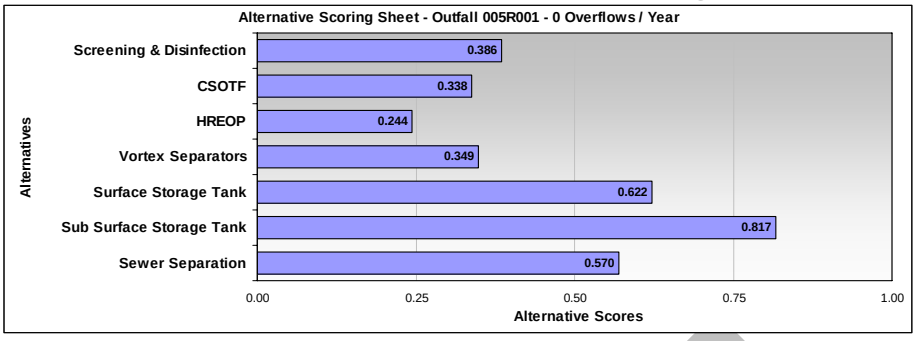
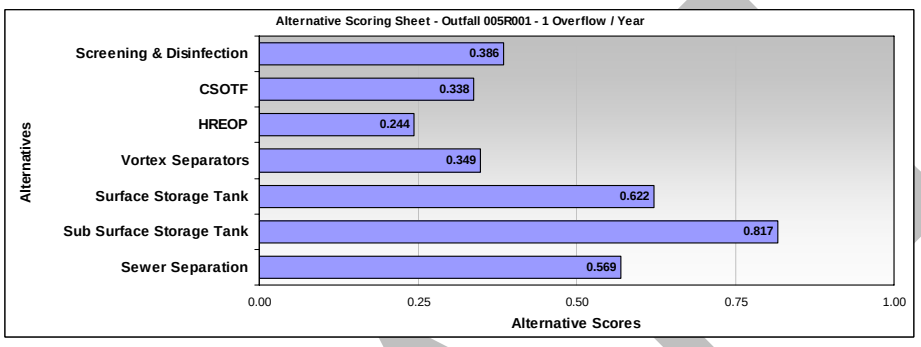
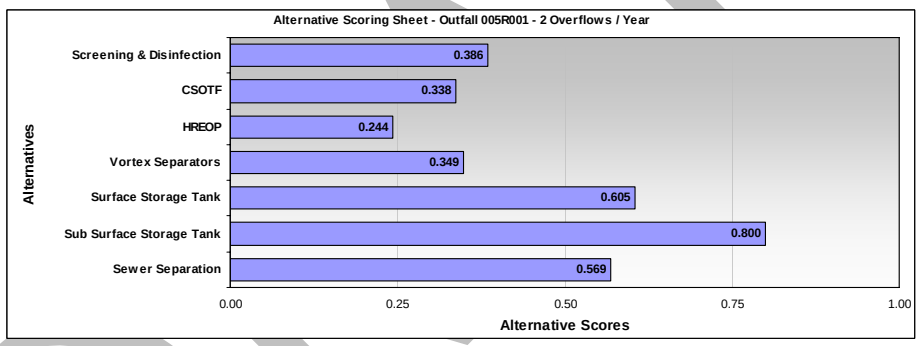
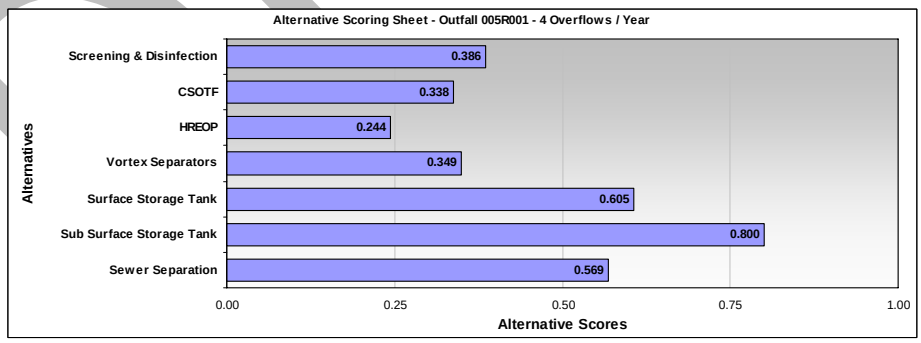
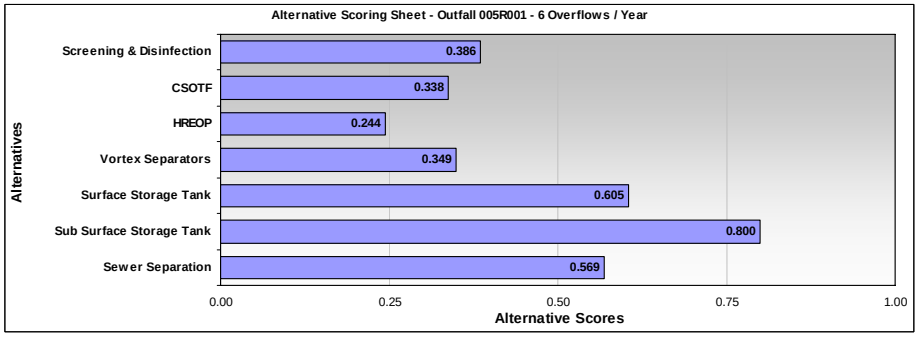
# Attachment 3 – Alternative Scoring Sheet





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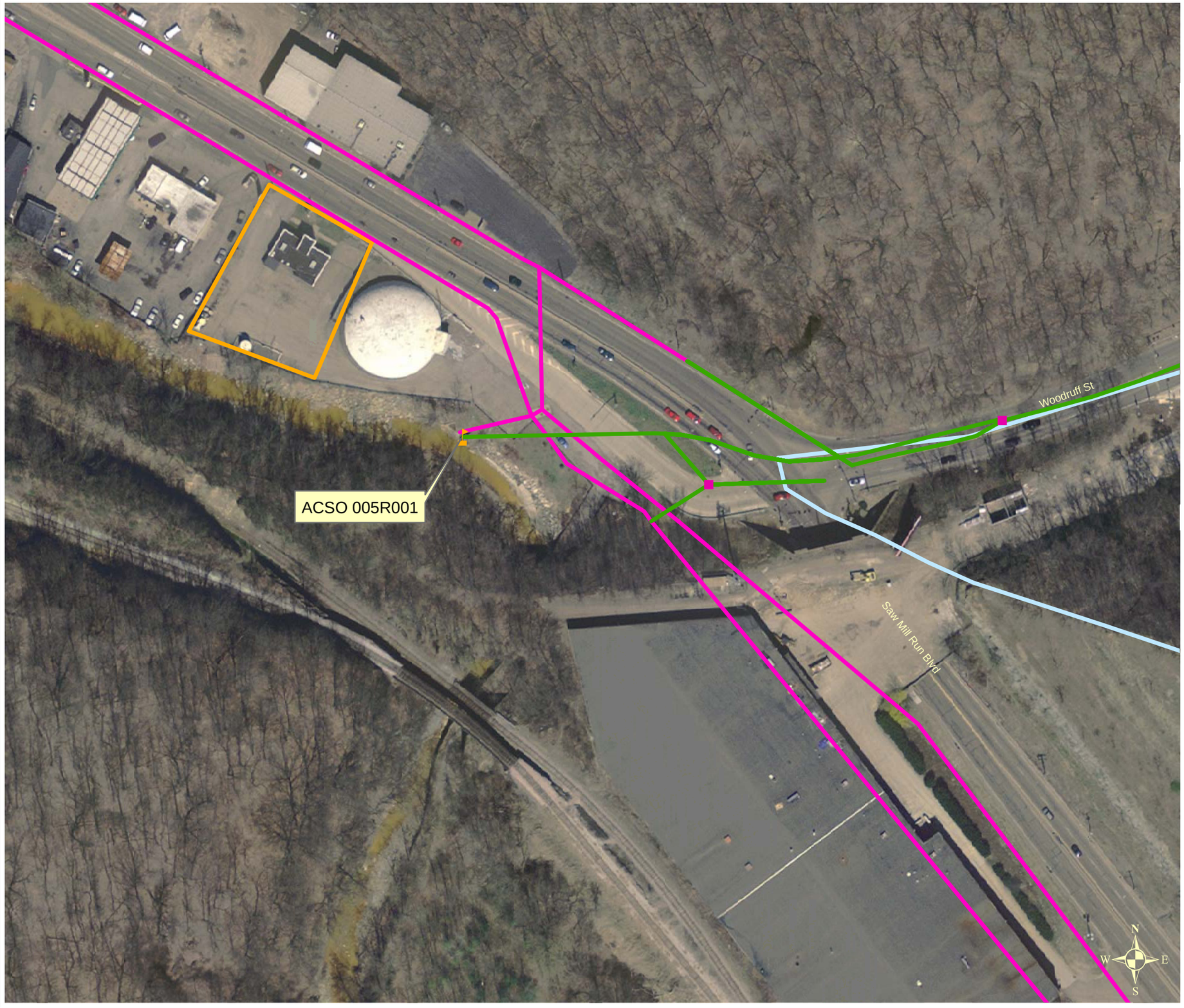


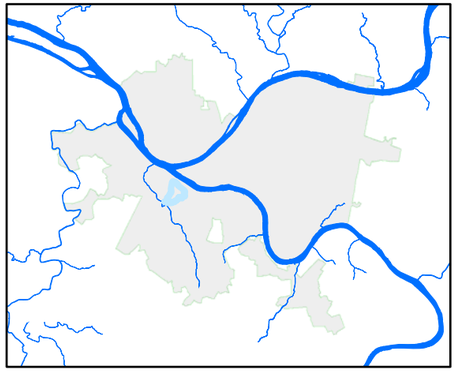

Area Overview

## Legend

- Sewershed Boundary
- Facility Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Chamber
- Combined Sewer Outfall

100 0 100 Feet

# Attachment 4
# CSO 005R001
# Facilities Boundary Map
# Woodruff St.
# Sewershed

CSO Controls Alternatives

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Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 4 | 2 | 3 | 3 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 4 | 3 | 3 | 3 | 3 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 3 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 3 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 2 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.570** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.622** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 4 | 0.75 | 0.147 | 0.110 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.700** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.610** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.647** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.647** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.423** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.370** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

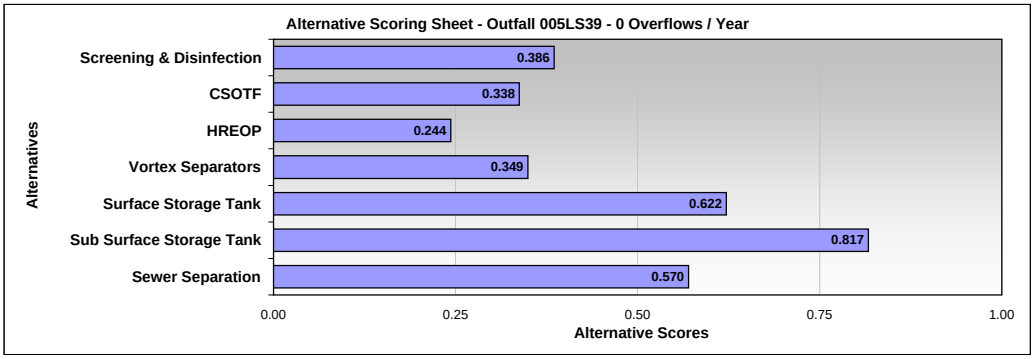
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.491** |

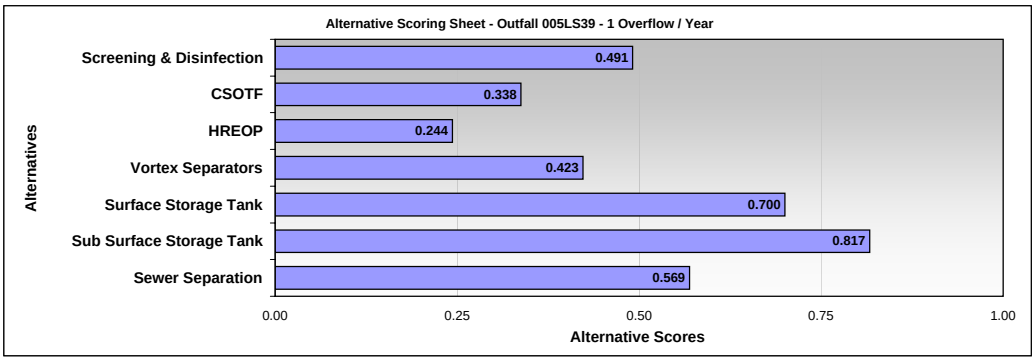
| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

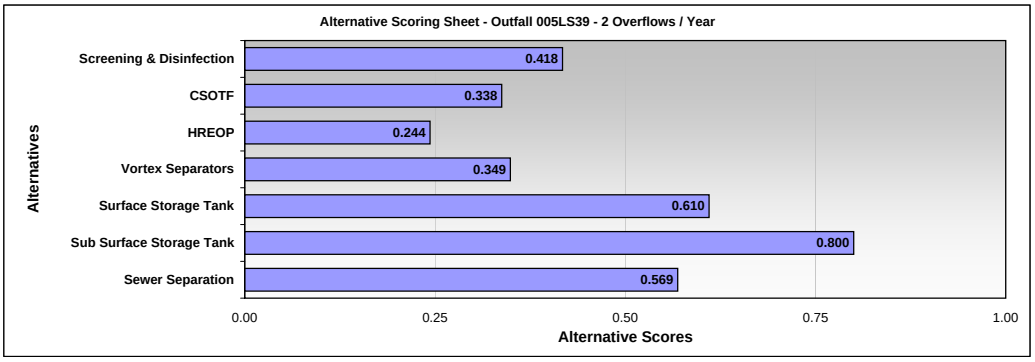
Total Score

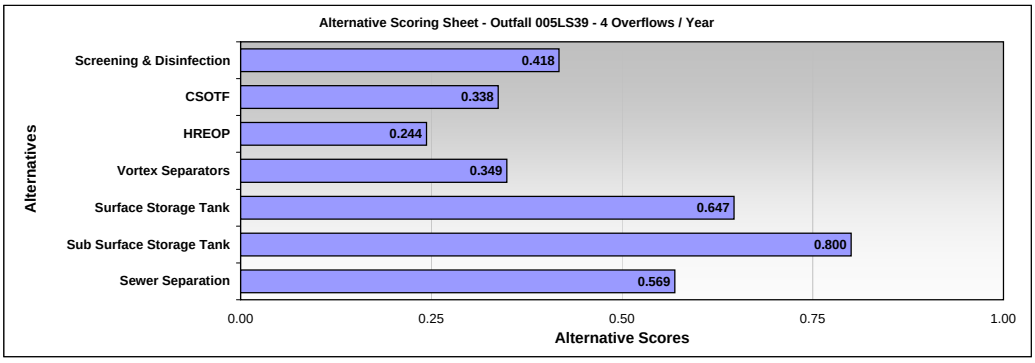
| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

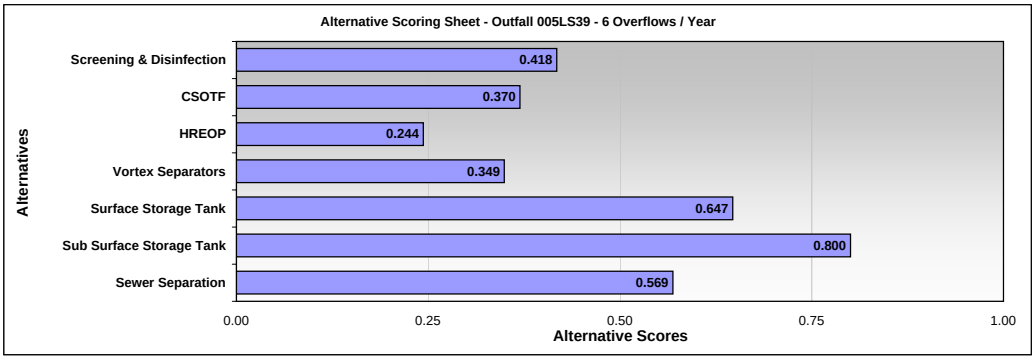
| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |


Alternative Scoring Sheet - Outfall 005LS39 - 0 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.386
0.338
0.244
0.349
0.622
0.817
0.570
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005LS39 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.491
0.338
0.244
0.423
0.700
0.817
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005LS39 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.610
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005LS39 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.647
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005LS39 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.370
0.244
0.349
0.647
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SEWER SEPARATION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Sewer Separation Parameters** | | | | | |
| Drainage Area - Suburban Areas (Acres) | | 102 | | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **15,300,000** | | | |
| **2. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only | |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **3. Land Acquisition Parameters** | | | | | |
| Land Acquisition - Sewer Separation (SF) | | 44,431 | | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **89,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **15,428,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 1.00 | 134,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 1.18 | 158,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 127 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 85 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 1.21 | 161,925 | **Sufficient Volume** |
| Tank Area (SF) | | 11,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **947,000** | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 57.97 | 89.70 | = Peak Rate |
| Force Main Diameter (In) | | 52 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **8,724,000** | **$ 62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 89.70 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 237,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,190 | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **105,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 57.97 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 34,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **68,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **13,166,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 2 | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 1.00 | 134,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 1.18 | 158,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | | 127 | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 85 | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 1.21 | 161,925 | **Sufficient Volume** |
| Tank Area (SF) | | 11,000 | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **4,005,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 1.00 | 1.55 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | | 7 | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **1,138,000** | **$ 17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 89.70 | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 237,000 | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 11,850 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **635,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 57.97 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | | 34,000 | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **68,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **9,123,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 57.97 | | 89.70 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 7 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **3,607,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 63.76 | | 98.66 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 55 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,431,000** | **$** | **66,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 89.70 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 202,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 10,100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **561,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 57.97 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 63.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 125 | | 60 | |
| Passes / Detention (Min) | | 5 | | 15.20 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **1,499,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 60,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **120,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **18,804,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 0 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 57.97 | 89.70 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 9,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 140 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 70 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.88 | 117,600 | |
| **Construction Cost (CSOTF)** | **$** | **16,412,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 57.97 | 89.70 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 52 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **8,724,000** | **$ 62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 89.70 | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 176,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 8,800 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **503,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 57.97 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 57.97 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 120 | 57 | |
| Passes / Detention (Min) | | 5 | **15.25** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **1,410,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 28,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **56,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **30,427,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 57.97 | | 89.70 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 690 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 38 | | **OK** | Input by Engineer |
| Width (Ft) | | 19 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **10,580,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 63.76 | | 98.66 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 55 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **9,431,000** | **$** | **66,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 89.70 | | | Ref: Technical Parameters |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 850 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **81,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 57.97 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 63.76 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 125 | | 60 | Input by Engineer |
| Passes / Detention (Min) | | 5 | | **15.20** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,499,000 | $ | 1,561,000 | |
| **Construction Cost (Disinfection)** | **$** | **3,060,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 49,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **98,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **26,576,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 134,179 | CF |
| | 1.00 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 89.70 | CFS |
| | 57.97 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 57.97 | | 89.70 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **3,096,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 57.97 | | 89.70 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 52 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **8,724,000** | **$** | **62,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 89.70 | | | Ref: CSO Statistics |
| Diameter (In) | | 66 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **125,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 17,900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 900 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **84,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 57.97 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 120 | | 57 | |
| Passes / Detention (Min) | | 5 | | **15.25** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 1,410,000 | $ | 1,465,000 | |
| **Construction Cost (Disinfection)** | **$** | **2,875,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 29,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **58,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **15,063,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 102 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **15,300,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 44,431 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **89,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **15,428,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.95 | | 127,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.11 | | 149,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 123 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 82 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.13 | | 151,290 | **Sufficient Volume** |
| Tank Area (SF) | 10,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **889,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 22.85 | | 35.36 | = Peak Rate |
| Force Main Diameter (In) | 33 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **4,440,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 35.36 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 224,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,120 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **100,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 22.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,470,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 33,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **66,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **7,129,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.95 | | 127,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.11 | | 149,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 123 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 82 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.13 | | 151,290 | **Sufficient Volume** |
| Tank Area (SF) | 10,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **3,831,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.95 | | 1.47 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 7 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **1,090,000** | **$** | **17,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 35.36 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 224,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 11,200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **608,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 22.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,470,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 33,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **66,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **7,205,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 22.85 | | 35.36 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.14 | | 38.90 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,718,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.36 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 22.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,470,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 25.14 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 79 | | 38 | |
| Passes | | 3 | | **15.44** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **844,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 24,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,505,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 22.85 | | 35.36 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 3,900 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 89 | | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 45 | | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.36 | | 48,060 | |
| **Construction Cost (CSOTF)** | **$** | **16,371,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 22.85 | | 35.36 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 33 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,440,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.36 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 72,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,600 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **250,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 22.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,470,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 22.85 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 75 | | 36 | |
| Passes | | 3 | | 15.27 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **800,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 14,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **28,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **23,523,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 22.85 | | 35.36 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 270 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 24 | | **OK** | Input by Engineer |
| Width (Ft) | | 12 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **4,819,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 25.14 | | 38.90 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,718,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.36 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **40,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 22.85 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,470,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 25.14 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 79 | | 38 | Input by Engineer |
| Passes | | 3 | | **15.44** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 844,000 | $ | 725,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,569,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 32,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **64,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **12,845,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 126,609 | CF |
| | 0.95 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 35.36 | CFS |
| | 22.85 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 22.85 | | 35.36 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,470,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 22.85 | | 35.36 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 33 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,440,000** | **$** | **41,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 35.36 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 360 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **41,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 22.85 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 75 | | 36 | |
| Passes | | 3 | | **15.27** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 800,000 | $ | 676,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,476,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **7,641,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 102 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **15,300,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 44,431 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **89,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **15,428,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.43 | | 57,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.51 | | 67,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 83 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 56 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.52 | | 69,720 | **Sufficient Volume** |
| Tank Area (SF) | 5,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **375,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 18.00 | | 27.85 | = Peak Rate |
| Force Main Diameter (In) | 29 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **3,848,000** | **$** | **37,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 27.85 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 101,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 510 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **54,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 18.00 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,246,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 26,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **52,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **5,735,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.43 | | 57,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.51 | | 67,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 83 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 56 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.52 | | 69,720 | **Sufficient Volume** |
| Tank Area (SF) | 5,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,236,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.43 | | 0.66 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 5 | | | Input by Engineer |
| Force Main Velocity (FPS) | 4.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **649,000** | **$** | **15,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 27.85 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 101,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 5,050 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **326,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 18.00 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **1,246,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 26,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **52,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,647,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 18.00 | | 27.85 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 19.80 | | 30.64 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 31 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,067,000** | **$** | **39,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 27.85 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 18.00 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,246,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 19.80 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 70 | | 34 | |
| Passes | | 3 | | **15.54** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **741,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 19,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **38,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,514,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 18.00 | 27.85 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 3,000 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 78 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 39 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.27 | 36,504 | |
| **Construction Cost (CSOTF)** | **$** | **16,374,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 18.00 | 27.85 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 29 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,848,000** | **$ 37,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 27.85 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 55,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 2,750 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **202,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 18.00 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,246,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 18.00 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 67 | 32 | |
| Passes | | 3 | **15.40** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **706,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 12,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **24,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **22,560,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 18.00 | | 27.85 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 220 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 22 | | **OK** | Input by Engineer |
| Width (Ft) | | 11 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **4,042,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 19.80 | | 30.64 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 31 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,067,000** | **$** | **39,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 27.85 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 300 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **36,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 18.00 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,246,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 19.80 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 70 | | 34 | Input by Engineer |
| Passes | | 3 | | **15.54** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 741,000 | $ | 623,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,364,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 30,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **60,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **10,977,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 57,388 | CF |
| | 0.43 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 27.85 | CFS |
| | 18.00 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 2 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 18.00 | | 27.85 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,246,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 18.00 | | 27.85 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 29 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,848,000** | **$** | **37,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 27.85 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 5,600 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 280 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **34,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 18.00 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 67 | | 32 | |
| Passes | | 3 | | **15.40** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 706,000 | $ | 585,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,291,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **6,627,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 102 | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **15,300,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 44,431 | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **89,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **15,428,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.31 | | 42,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.37 | | 49,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 71 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 48 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.38 | | 51,120 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **267,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 12.07 | | 18.68 | = Peak Rate |
| Force Main Diameter (In) | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 2,976,000** | | **$ 32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 18.68 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 74,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 370 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$ 42,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 12.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 971,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 48,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | **4,438,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.31 | | 42,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.37 | | 49,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 71 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 48 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.38 | | 51,120 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,882,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.31 | | 0.49 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **552,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 18.68 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 74,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,700 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **255,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 12.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **971,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 24,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **48,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,824,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.07 | | 18.68 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.28 | | 20.55 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,272,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.68 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 12.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **971,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 13.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 58 | | 28 | |
| Passes | | 3 | | **15.81** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **613,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 13,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **26,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **5,277,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.07 | 18.68 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,100 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 66 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 33 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.20 | 26,136 | |
| **Construction Cost (CSOTF)** | **$** | **16,379,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 12.07 | 18.68 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,976,000** | **$ 32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 18.68 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 39,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,950 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **154,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 12.07 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **971,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 12.07 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 55 | 26 | |
| Passes | | 3 | **15.31** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **588,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 10,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **21,222,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.07 | | 18.68 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 150 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 18 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,099,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.28 | | 20.55 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 25 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,272,000** | **$** | **33,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.68 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 12.07 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **971,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 13.28 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 58 | | 28 | Input by Engineer |
| Passes | | 3 | | **15.81** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 613,000 | $ | 493,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,106,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 27,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **54,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,663,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 42,002 | CF |
| | 0.31 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 18.68 | CFS |
| | 12.07 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 4 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 12.07 | | 18.68 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **971,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 12.07 | | 18.68 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,976,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 18.68 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,700 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 190 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **25,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 12.07 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 55 | | 26 | |
| Passes | | 3 | | **15.31** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 588,000 | $ | 460,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,048,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **5,202,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 102 | **Typ 0, Rev as Req'd** | |
| % Separation - Suburban Areas | | 100% | Complete Separation | |
| Drainage Area - Urban Areas (Acres) | | 0 | Ref: CSO Statistics, Input by Engineer | |
| % Separation - Urban Areas | | 100% | Complete Separation | |
| **Construction Cost (Sewer Separation)** | **$** | **15,300,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | **Typ 1 Reg, Rev as Req'd** | |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 44,431 | 1% Drainage Area | |
| Land Required Cost ($ / SF) | $ | 2 | Ref: Technical Parameters | |
| **Land Acquisition Cost** | **$** | **89,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **15,428,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.29 | | 38,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.34 | | 45,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 68 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 46 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.35 | | 46,920 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **241,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 9.69 | | 15.00 | = Peak Rate |
| Force Main Diameter (In) | 21 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,778,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.00 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 68,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 340 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **39,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 9.69 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **861,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 23,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **46,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,096,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.29 | | 38,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.34 | | 45,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 68 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 46 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.35 | | 46,920 | **Sufficient Volume** |
| Tank Area (SF) | 3,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,795,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.29 | | 0.44 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **528,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.00 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 68,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 3,400 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **239,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 9.69 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **861,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 23,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **46,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,585,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 6 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.69 | 15.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 10.66 | 16.50 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 22 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,866,000** | **$ 30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.00 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 9.69 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **861,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 10.66 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 52 | 25 | |
| Passes | | 3 | **15.76** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **560,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 10,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 4,699,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.69 | 15.00 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 59 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 30 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.16 | 21,240 | |
| **Construction Cost (CSOTF)** | **$** | **16,382,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 9.69 | 15.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 21 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,778,000** | **$ 29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.00 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 32,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **132,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 9.69 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **861,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 9.69 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 49 | 24 | |
| Passes | | 3 | **15.68** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **540,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 9,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **20,842,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 9.69 | | 15.00 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 120 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 16 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,723,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 10.66 | | 16.50 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 22 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,866,000** | **$** | **30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.00 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 9.69 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **861,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 10.66 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 52 | | 25 | Input by Engineer |
| Passes | | 3 | | **15.76** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 560,000 | $ | 434,000 | |
| **Construction Cost (Disinfection)** | **$** | **994,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 26,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **7,649,000** | | | |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 71 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 38,261 | CF |
| | 0.29 | MG |
| Total Volume | 1,027,005 | CF |
| | 7.68 | MG |
| Peak Rate | 15.00 | CFS |
| | 9.69 | MGD |

| Capital Costs - 005LS39 / Sewershed ACSO 005LS39 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 9.69 | | 15.00 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **861,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 9.69 | | 15.00 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 21 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,778,000** | **$** | **29,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.00 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 9.69 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 49 | | 24 | |
| Passes | | 3 | | **15.68** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 540,000 | $ | 410,000 | |
| **Construction Cost (Disinfection)** | **$** | **950,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,787,000** | | | |

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| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 57.97 | $283,186 | 20 | 10.910 | $3,089,540 |
| | Tank O&M | No. Events / Yr | 71 | $45,990 | 50 | 14.484 | $666,099 |
| | | Const Cost ($) | $947,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 58 | $12,854 | 20 | 10.910 | $140,236 |
| | Odor Control O&M | Capacity (cfm) | 1,190 | $4,165 | 20 | 10.910 | $45,440 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $44,301 |
| | | | **Total Annual O&M** | **$347,000** | | **Total PW O&M** | **$3,986,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.00 | $18,843 | 20 | 10.910 | $205,575 |
| | Tank O&M | No. Events / Yr | 71 | $53,635 | 50 | 14.484 | $776,826 |
| | | Const Cost ($) | $4,005,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 58 | $12,854 | 20 | 10.910 | $140,236 |
| | Odor Control O&M | Capacity (cfm) | 11,850 | $41,475 | 20 | 10.910 | $452,490 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,791 |
| | | | **Total Annual O&M** | **$127,000** | | **Total PW O&M** | **$1,590,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 57.97 | $283,186 | 20 | 10.910 | $3,089,540 |
| | Sed. Basin O&M | Flow Rate (mgd) | 57.97 | $6,521 | 50 | 14.484 | $94,452 |
| | Screening O&M | Flow Rate (mgd) | 57.97 | $12,854 | 20 | 10.910 | $140,236 |
| | Disinfection O&M | Flow Rate (mgd) | 57.97 | $190,729 | 20 | 10.910 | $2,080,846 |
| | Odor Control O&M | Capacity (cfm) | 8,800.00 | $30,800 | 20 | 10.910 | $336,026 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $49,218 |
| | | | **Total Annual O&M** | **$525,000** | | **Total PW O&M** | **$5,790,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 63.76 | $301,805 | 20 | 10.910 | $3,292,671 |
| | HREP O&M | Flow Rate (mgd) | 57.97 | $253,592 | 20 | 10.910 | $2,766,670 |
| | Screening O&M | Flow Rate (mgd) | 57.97 | $12,854 | 20 | 10.910 | $140,236 |
| | Disinfection O&M | Flow Rate (mgd) | 63.76 | $202,131 | 20 | 10.910 | $2,205,242 |
| | Odor Control O&M | Capacity (cfm) | 850.00 | $2,975 | 20 | 10.910 | $32,457 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $79,975 |
| | | | **Total Annual O&M** | **$774,000** | | **Total PW O&M** | **$8,517,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 63.76 | $301,805 | 20 | 10.910 | $3,292,671 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 57.97 | $6,521 | 20 | 10.910 | $71,147 |
| | Screening O&M | Flow Rate (mgd) | 57.97 | $12,854 | 20 | 10.910 | $140,236 |
| | Disinfection O&M | Flow Rate (mgd) | 63.76 | $202,131 | 20 | 10.910 | $2,205,242 |
| | Odor Control O&M | Capacity (cfm) | 10,100.00 | $35,350 | 20 | 10.910 | $385,666 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $57,408 |
| | | | **Total Annual O&M** | **$559,000** | | **Total PW O&M** | **$6,152,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 57.97 | $283,186 | 20 | 10.910 | $3,089,540 |
| | Screening O&M | Flow Rate (mgd) | 57.97 | $12,854 | 20 | 10.910 | $140,236 |
| | Disinfection O&M | Flow Rate (mgd) | 57.97 | $190,729 | 20 | 10.910 | $2,080,846 |
| | Odor Control O&M | Capacity (cfm) | 900.00 | $3,150 | 20 | 10.910 | $34,366 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $48,079 |
| | | | **Total Annual O&M** | **$490,000** | | **Total PW O&M** | **$5,393,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 22.85 | $152,054 | 20 | 10.910 | $1,658,896 |
| | Tank O&M | No. Events / Yr | 71 | $45,845 | 50 | 14.484 | $663,999 |
| | | Const Cost ($) | $889,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 23 | $9,425 | 20 | 10.910 | $102,829 |
| | Odor Control O&M | Capacity (cfm) | 1,120 | $3,920 | 20 | 10.910 | $42,767 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $22,386 |
| | | | **Total Annual O&M** | **$212,000** | | **Total PW O&M** | **$2,491,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.95 | $18,126 | 20 | 10.910 | $197,753 |
| | Tank O&M | No. Events / Yr | 71 | $53,200 | 50 | 14.484 | $770,526 |
| | | Const Cost ($) | $3,831,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 23 | $9,425 | 20 | 10.910 | $102,829 |
| | Odor Control O&M | Capacity (cfm) | 11,200 | $39,200 | 20 | 10.910 | $427,670 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $10,099 |
| | | | **Total Annual O&M** | **$120,000** | | **Total PW O&M** | **$1,509,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 22.85 | $152,054 | 20 | 10.910 | $1,658,896 |
| | Sed. Basin O&M | Flow Rate (mgd) | 22.85 | $2,571 | 50 | 14.484 | $37,237 |
| | Screening O&M | Flow Rate (mgd) | 22.85 | $9,425 | 20 | 10.910 | $102,829 |
| | Disinfection O&M | Flow Rate (mgd) | 22.85 | $108,181 | 20 | 10.910 | $1,180,253 |
| | Odor Control O&M | Capacity (cfm) | 3,600.00 | $12,600 | 20 | 10.910 | $137,465 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,970 |
| | | | **Total Annual O&M** | **$285,000** | | **Total PW O&M** | **$3,142,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 25.14 | $162,051 | 20 | 10.910 | $1,767,965 |
| | HREP O&M | Flow Rate (mgd) | 22.85 | $146,690 | 20 | 10.910 | $1,600,376 |
| | Screening O&M | Flow Rate (mgd) | 22.85 | $9,425 | 20 | 10.910 | $102,829 |
| | Disinfection O&M | Flow Rate (mgd) | 25.14 | $114,649 | 20 | 10.910 | $1,250,810 |
| | Odor Control O&M | Capacity (cfm) | 350.00 | $1,225 | 20 | 10.910 | $13,365 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $38,760 |
| | | | **Total Annual O&M** | **$435,000** | | **Total PW O&M** | **$4,774,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 25.14 | $162,051 | 20 | 10.910 | $1,767,965 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 22.85 | $2,571 | 20 | 10.910 | $28,049 |
| | Screening O&M | Flow Rate (mgd) | 22.85 | $9,425 | 20 | 10.910 | $102,829 |
| | Disinfection O&M | Flow Rate (mgd) | 25.14 | $114,649 | 20 | 10.910 | $1,250,810 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $25,544 |
| | | | **Total Annual O&M** | **$289,000** | | **Total PW O&M** | **$3,175,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 22.85 | $152,054 | 20 | 10.910 | $1,658,896 |
| | Screening O&M | Flow Rate (mgd) | 22.85 | $9,425 | 20 | 10.910 | $102,829 |
| | Disinfection O&M | Flow Rate (mgd) | 22.85 | $108,181 | 20 | 10.910 | $1,180,253 |
| | Odor Control O&M | Capacity (cfm) | 360.00 | $1,260 | 20 | 10.910 | $13,747 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,401 |
| | | | **Total Annual O&M** | **$271,000** | | **Total PW O&M** | **$2,980,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 18.00 | $129,639 | 20 | 10.910 | $1,414,348 |
| | Tank O&M | No. Events / Yr | 71 | $44,560 | 50 | 14.484 | $645,387 |
| | | Const Cost ($) | $375,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 18 | $8,987 | 20 | 10.910 | $98,045 |
| | Odor Control O&M | Capacity (cfm) | 510 | $1,785 | 20 | 10.910 | $19,474 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,236 |
| | | | **Total Annual O&M** | **$185,000** | | **Total PW O&M** | **$2,196,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.43 | $10,683 | 20 | 10.910 | $116,555 |
| | Tank O&M | No. Events / Yr | 71 | $49,212 | 50 | 14.484 | $712,772 |
| | | Const Cost ($) | $2,236,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 18 | $8,987 | 20 | 10.910 | $98,045 |
| | Odor Control O&M | Capacity (cfm) | 5,050 | $17,675 | 20 | 10.910 | $192,833 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,924 |
| | | | **Total Annual O&M** | **$87,000** | | **Total PW O&M** | **$1,127,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 18.00 | $129,639 | 20 | 10.910 | $1,414,348 |
| | Sed. Basin O&M | Flow Rate (mgd) | 18.00 | $2,025 | 50 | 14.484 | $29,329 |
| | Screening O&M | Flow Rate (mgd) | 18.00 | $8,987 | 20 | 10.910 | $98,045 |
| | Disinfection O&M | Flow Rate (mgd) | 18.00 | $93,540 | 20 | 10.910 | $1,020,513 |
| | Odor Control O&M | Capacity (cfm) | 2,750.00 | $9,625 | 20 | 10.910 | $105,008 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,559 |
| | | | **Total Annual O&M** | **$244,000** | | **Total PW O&M** | **$2,689,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 19.80 | $138,162 | 20 | 10.910 | $1,507,339 |
| | HREP O&M | Flow Rate (mgd) | 18.00 | $127,477 | 20 | 10.910 | $1,390,763 |
| | Screening O&M | Flow Rate (mgd) | 18.00 | $8,987 | 20 | 10.910 | $98,045 |
| | Disinfection O&M | Flow Rate (mgd) | 19.80 | $99,132 | 20 | 10.910 | $1,081,521 |
| | Odor Control O&M | Capacity (cfm) | 300.00 | $1,050 | 20 | 10.910 | $11,455 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $33,090 |
| | | | **Total Annual O&M** | **$375,000** | | **Total PW O&M** | **$4,122,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 19.80 | $138,162 | 20 | 10.910 | $1,507,339 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 18.00 | $2,025 | 20 | 10.910 | $22,092 |
| | Screening O&M | Flow Rate (mgd) | 18.00 | $8,987 | 20 | 10.910 | $98,045 |
| | Disinfection O&M | Flow Rate (mgd) | 19.80 | $99,132 | 20 | 10.910 | $1,081,521 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,998 |
| | | | **Total Annual O&M** | **$249,000** | | **Total PW O&M** | **$2,731,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 18.00 | $129,639 | 20 | 10.910 | $1,414,348 |
| | Screening O&M | Flow Rate (mgd) | 18.00 | $8,987 | 20 | 10.910 | $98,045 |
| | Disinfection O&M | Flow Rate (mgd) | 18.00 | $93,540 | 20 | 10.910 | $1,020,513 |
| | Odor Control O&M | Capacity (cfm) | 280.00 | $980 | 20 | 10.910 | $10,692 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,102 |
| | | | **Total Annual O&M** | **$234,000** | | **Total PW O&M** | **$2,565,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 12.07 | $99,269 | 20 | 10.910 | $1,083,017 |
| | Tank O&M | No. Events / Yr | 71 | $44,290 | 50 | 14.484 | $641,477 |
| | | Const Cost ($) | $267,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,463 | 20 | 10.910 | $92,328 |
| | Odor Control O&M | Capacity (cfm) | 370 | $1,295 | 20 | 10.910 | $14,128 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,897 |
| | | | **Total Annual O&M** | **$154,000** | | **Total PW O&M** | **$1,846,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.31 | $8,673 | 20 | 10.910 | $94,617 |
| | Tank O&M | No. Events / Yr | 71 | $48,327 | 50 | 14.484 | $699,954 |
| | | Const Cost ($) | $1,882,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 12 | $8,463 | 20 | 10.910 | $92,328 |
| | Odor Control O&M | Capacity (cfm) | 3,700 | $12,950 | 20 | 10.910 | $141,284 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,587 |
| | | | **Total Annual O&M** | **$79,000** | | **Total PW O&M** | **$1,034,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 12.07 | $99,269 | 20 | 10.910 | $1,083,017 |
| | Sed. Basin O&M | Flow Rate (mgd) | 12.07 | $1,358 | 50 | 14.484 | $19,669 |
| | Screening O&M | Flow Rate (mgd) | 12.07 | $8,463 | 20 | 10.910 | $92,328 |
| | Disinfection O&M | Flow Rate (mgd) | 12.07 | $73,332 | 20 | 10.910 | $800,050 |
| | Odor Control O&M | Capacity (cfm) | 1,950.00 | $6,825 | 20 | 10.910 | $74,460 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,801 |
| | | | **Total Annual O&M** | **$190,000** | | **Total PW O&M** | **$2,086,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 13.28 | $105,796 | 20 | 10.910 | $1,154,223 |
| | HREP O&M | Flow Rate (mgd) | 12.07 | $100,784 | 20 | 10.910 | $1,099,544 |
| | Screening O&M | Flow Rate (mgd) | 12.07 | $8,463 | 20 | 10.910 | $92,328 |
| | Disinfection O&M | Flow Rate (mgd) | 13.28 | $77,716 | 20 | 10.910 | $847,879 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,158 |
| | | | **Total Annual O&M** | **$294,000** | | **Total PW O&M** | **$3,228,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 13.28 | $105,796 | 20 | 10.910 | $1,154,223 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 12.07 | $1,358 | 20 | 10.910 | $14,816 |
| | Screening O&M | Flow Rate (mgd) | 12.07 | $8,463 | 20 | 10.910 | $92,328 |
| | Disinfection O&M | Flow Rate (mgd) | 13.28 | $77,716 | 20 | 10.910 | $847,879 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,658 |
| | | | **Total Annual O&M** | **$194,000** | | **Total PW O&M** | **$2,127,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 12.07 | $99,269 | 20 | 10.910 | $1,083,017 |
| | Screening O&M | Flow Rate (mgd) | 12.07 | $8,463 | 20 | 10.910 | $92,328 |
| | Disinfection O&M | Flow Rate (mgd) | 12.07 | $73,332 | 20 | 10.910 | $800,050 |
| | Odor Control O&M | Capacity (cfm) | 190.00 | $665 | 20 | 10.910 | $7,255 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $16,451 |
| | | | **Total Annual O&M** | **$182,000** | | **Total PW O&M** | **$1,999,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 9.69 | $85,728 | 20 | 10.910 | $935,284 |
| | Tank O&M | No. Events / Yr | 71 | $44,225 | 50 | 14.484 | $640,535 |
| | | Const Cost ($) | $241,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,256 | 20 | 10.910 | $90,074 |
| | Odor Control O&M | Capacity (cfm) | 340 | $1,190 | 20 | 10.910 | $12,983 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,782 |
| | | | **Total Annual O&M** | **$140,000** | | **Total PW O&M** | **$1,693,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.29 | $8,149 | 20 | 10.910 | $88,901 |
| | Tank O&M | No. Events / Yr | 71 | $48,110 | 50 | 14.484 | $696,804 |
| | | Const Cost ($) | $1,795,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,256 | 20 | 10.910 | $90,074 |
| | Odor Control O&M | Capacity (cfm) | 3,400 | $11,900 | 20 | 10.910 | $129,828 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $5,146 |
| | | | **Total Annual O&M** | **$77,000** | | **Total PW O&M** | **$1,011,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 9.69 | $85,728 | 20 | 10.910 | $935,284 |
| | Sed. Basin O&M | Flow Rate (mgd) | 9.69 | $1,090 | 50 | 14.484 | $15,793 |
| | Screening O&M | Flow Rate (mgd) | 9.69 | $8,256 | 20 | 10.910 | $90,074 |
| | Disinfection O&M | Flow Rate (mgd) | 9.69 | $64,153 | 20 | 10.910 | $699,907 |
| | Odor Control O&M | Capacity (cfm) | 1,600.00 | $5,600 | 20 | 10.910 | $61,096 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,504 |
| | | | **Total Annual O&M** | **$165,000** | | **Total PW O&M** | **$1,818,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 10.66 | $91,364 | 20 | 10.910 | $996,777 |
| | HREP O&M | Flow Rate (mgd) | 9.69 | $88,578 | 20 | 10.910 | $966,379 |
| | Screening O&M | Flow Rate (mgd) | 9.69 | $8,256 | 20 | 10.910 | $90,074 |
| | Disinfection O&M | Flow Rate (mgd) | 10.66 | $67,988 | 20 | 10.910 | $741,749 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,022 |
| | | | **Total Annual O&M** | **$257,000** | | **Total PW O&M** | **$2,824,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 10.66 | $91,364 | 20 | 10.910 | $996,777 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 9.69 | $1,090 | 20 | 10.910 | $11,896 |
| | Screening O&M | Flow Rate (mgd) | 9.69 | $8,256 | 20 | 10.910 | $90,074 |
| | Disinfection O&M | Flow Rate (mgd) | 10.66 | $67,988 | 20 | 10.910 | $741,749 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,558 |
| | | | **Total Annual O&M** | **$169,000** | | **Total PW O&M** | **$1,856,000** |

| ACSO 005LS39 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 9.69 | $85,728 | 20 | 10.910 | $935,284 |
| | Screening O&M | Flow Rate (mgd) | 9.69 | $8,256 | 20 | 10.910 | $90,074 |
| | Disinfection O&M | Flow Rate (mgd) | 9.69 | $64,153 | 20 | 10.910 | $699,907 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,202 |
| | | | **Total Annual O&M** | **$159,000** | | **Total PW O&M** | **$1,746,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $15.4 | $15,428,000 | $0 |
| 1 | $15.4 | $15,428,000 | $0 |
| 2 | $15.4 | $15,428,000 | $0 |
| 4 | $15.4 | $15,428,000 | $0 |
| 6 | $15.4 | $15,428,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $10.7 | $9,123,000 | $1,590,000 |
| 1 | $8.7 | $7,205,000 | $1,509,000 |
| 2 | $5.8 | $4,647,000 | $1,127,000 |
| 4 | $4.9 | $3,824,000 | $1,034,000 |
| 6 | $4.6 | $3,585,000 | $1,011,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $17.2 | $13,166,000 | $3,986,000 |
| 1 | $9.6 | $7,129,000 | $2,491,000 |
| 2 | $7.9 | $5,735,000 | $2,196,000 |
| 4 | $6.3 | $4,438,000 | $1,846,000 |
| 6 | $5.8 | $4,096,000 | $1,693,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $25.0 | $18,804,000 | $6,152,000 |
| 1 | $10.7 | $7,505,000 | $3,175,000 |
| 2 | $9.2 | $6,514,000 | $2,731,000 |
| 4 | $7.4 | $5,277,000 | $2,127,000 |
| 6 | $6.6 | $4,699,000 | $1,856,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $35.1 | $26,576,000 | $8,517,000 |
| 1 | $17.6 | $12,845,000 | $4,774,000 |
| 2 | $15.1 | $10,977,000 | $4,122,000 |
| 4 | $11.9 | $8,663,000 | $3,228,000 |
| 6 | $10.5 | $7,649,000 | $2,824,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $36.2 | $30,427,000 | $5,790,000 |
| 1 | $26.7 | $23,523,000 | $3,142,000 |
| 2 | $25.2 | $22,560,000 | $2,689,000 |
| 4 | $23.3 | $21,222,000 | $2,086,000 |
| 6 | $22.7 | $20,842,000 | $1,818,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $20.5 | $15,063,000 | $5,393,000 |
| 1 | $10.6 | $7,641,000 | $2,980,000 |
| 2 | $9.2 | $6,627,000 | $2,565,000 |
| 4 | $7.2 | $5,202,000 | $1,999,000 |
| 6 | $6.5 | $4,787,000 | $1,746,000 |

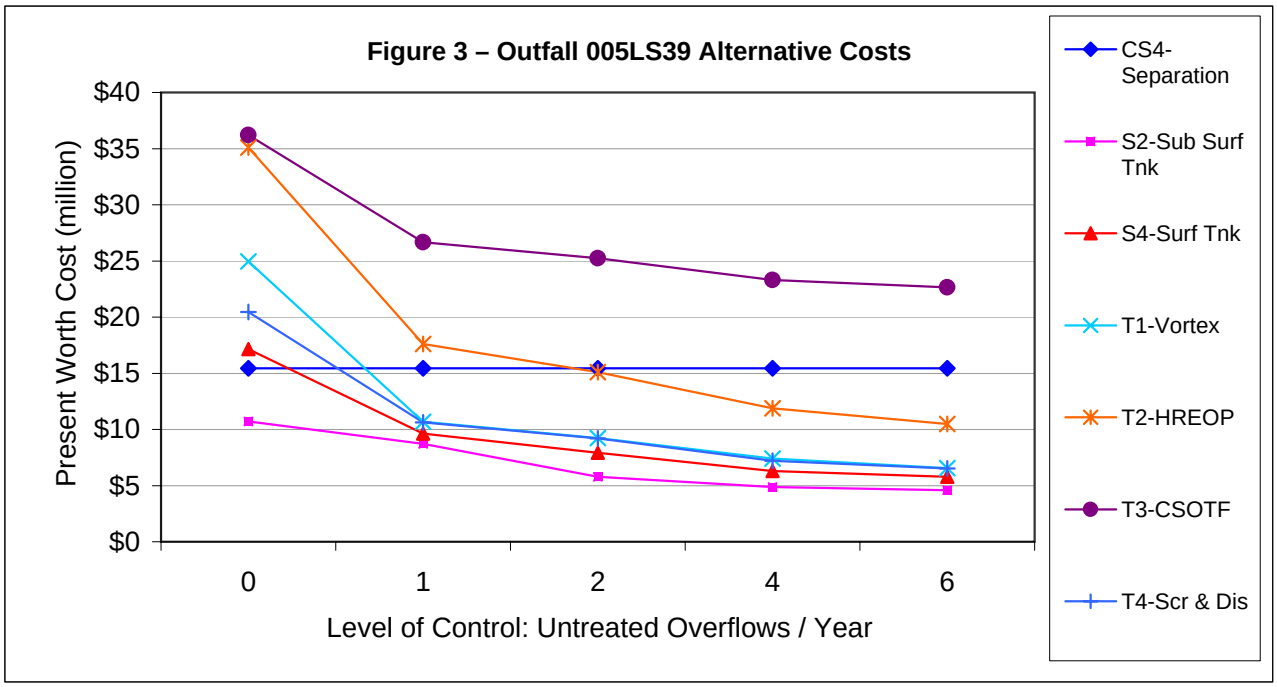


Figure 3 – Outfall 005LS39 Alternative Costs
Present Worth Cost (million)
$40
$35
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 005LS39 |
| **Location Name** | Olympia Street |
| **Model ID** | ADC 005LS39-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005LS39 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 71 |
| Peak Volume: | 134,179 $ft^3$ |
| | 1.00 MG |
| Total Volume: | 1,027,005 $ft^3$ |
| | 7.68 MG |
| Peak Rate: | 89.70 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 8/20/2005 18:15 | 70 | 8/20/2005 18:30 | 134179.07 | 1003.727 | 0 | 89.70 | 0 |
| 1/5/2005 13:05 | 1364 | 1/6/2005 3:30 | 126609.48 | 947.102 | 1 | 6.30 | 26 |
| 5/13/2005 22:30 | 139 | 5/13/2005 22:45 | 57387.51 | 429.287 | 2 | 27.85 | 2 |
| 11/29/2005 6:35 | 348 | 11/29/2005 7:00 | 45424.88 | 339.801 | 3 | 6.84 | 21 |
| 11/14/2005 21:45 | 400 | 11/14/2005 23:00 | 42001.82 | 314.195 | 4 | 6.34 | 24 |
| 7/5/2005 16:20 | 96 | 7/5/2005 16:30 | 38270.08 | 286.279 | 5 | 18.68 | 4 |
| 7/26/2005 19:45 | 40 | 7/26/2005 20:00 | 38261.21 | 286.213 | 6 | 35.36 | 1 |
| 4/22/2005 15:50 | 783 | 4/23/2005 4:00 | 30997.46 | 231.876 | 7 | 12.10 | 12 |
| 3/28/2005 9:00 | 679 | 3/28/2005 19:00 | 28090.78 | 210.133 | 8 | 4.28 | 34 |
| 1/11/2005 8:10 | 594 | 1/11/2005 11:30 | 26134.28 | 195.497 | 9 | 4.96 | 27 |
| 7/15/2005 17:35 | 53 | 7/15/2005 18:00 | 23662.97 | 177.011 | 10 | 13.21 | 10 |
| 8/29/2005 9:25 | 270 | 8/29/2005 13:45 | 20022.01 | 149.775 | 11 | 15.00 | 6 |
| 9/29/2005 5:30 | 54 | 9/29/2005 5:45 | 19884.19 | 148.744 | 12 | 20.86 | 3 |
| 5/11/2005 22:40 | 90 | 5/11/2005 22:45 | 17873.39 | 133.702 | 13 | 10.29 | 15 |
| 1/8/2005 1:10 | 399 | 1/8/2005 5:15 | 17755.86 | 132.823 | 14 | 6.41 | 23 |
| 1/5/2005 0:35 | 389 | 1/5/2005 5:00 | 17047.44 | 127.523 | 15 | 2.64 | 44 |
| 7/21/2005 14:25 | 30 | 7/21/2005 14:45 | 16966.07 | 126.915 | 16 | 16.19 | 5 |
| 1/3/2005 8:15 | 754 | 1/3/2005 13:45 | 16748.60 | 125.288 | 17 | 2.61 | 46 |
| 1/13/2005 22:40 | 259 | 1/14/2005 2:15 | 16343.96 | 122.261 | 18 | 4.62 | 30 |
| 6/11/2005 17:40 | 30 | 6/11/2005 18:00 | 14609.54 | 109.287 | 19 | 13.62 | 9 |
| 5/28/2005 8:35 | 605 | 5/28/2005 9:15 | 14521.23 | 108.626 | 20 | 3.63 | 36 |
| 4/2/2005 4:35 | 329 | 4/2/2005 6:45 | 14048.11 | 105.087 | 21 | 3.30 | 37 |
| 1/12/2005 0:50 | 170 | 1/12/2005 1:30 | 13967.41 | 104.483 | 22 | 6.43 | 22 |
| 11/9/2005 19:25 | 30 | 11/9/2005 19:45 | 13536.02 | 101.256 | 23 | 13.84 | 8 |
| 2/9/2005 15:05 | 120 | 2/9/2005 16:45 | 13101.16 | 98.003 | 24 | 8.94 | 18 |
| 5/14/2005 16:05 | 65 | 5/14/2005 16:15 | 12891.87 | 96.438 | 25 | 8.43 | 19 |
| 5/23/2005 16:20 | 35 | 5/23/2005 16:30 | 12780.85 | 95.607 | 26 | 11.80 | 13 |
| 7/12/2005 19:35 | 50 | 7/12/2005 20:00 | 12761.51 | 95.462 | 27 | 9.25 | 17 |
| 2/20/2005 19:20 | 89 | 2/20/2005 20:00 | 10822.54 | 80.958 | 28 | 4.66 | 29 |
| 2/14/2005 5:50 | 844 | 2/14/2005 19:45 | 10703.54 | 80.068 | 29 | 1.67 | 53 |
| 10/25/2005 1:05 | 223 | 10/25/2005 3:45 | 9764.79 | 73.046 | 30 | 2.45 | 49 |
| 8/27/2005 15:20 | 30 | 8/27/2005 15:30 | 9022.70 | 67.494 | 31 | 14.00 | 7 |
| 7/25/2005 13:20 | 20 | 7/25/2005 13:30 | 8417.99 | 62.971 | 32 | 12.97 | 11 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 10/7/2005 10:15 | 62 | 10/7/2005 10:45 | 8131.93 | 60.831 | 33 | 4.38 | 33 |
| 11/9/2005 4:20 | 25 | 11/9/2005 4:30 | 7725.70 | 57.792 | 34 | 11.66 | 14 |
| 12/15/2005 11:07 | 558 | 12/15/2005 14:00 | 7107.39 | 53.167 | 35 | 4.42 | 32 |
| 8/8/2005 8:50 | 65 | 8/8/2005 9:00 | 6895.24 | 51.580 | 36 | 2.96 | 41 |
| 10/21/2005 18:55 | 190 | 10/21/2005 19:15 | 6386.58 | 47.775 | 37 | 2.63 | 45 |
| 10/22/2005 6:25 | 67 | 10/22/2005 7:00 | 6372.97 | 47.673 | 38 | 3.72 | 35 |
| 7/17/2005 16:30 | 25 | 7/17/2005 16:45 | 6002.38 | 44.901 | 39 | 6.32 | 25 |
| 10/22/2005 15:46 | 82 | 10/22/2005 16:30 | 5330.06 | 39.871 | 40 | 3.06 | 39 |
| 9/16/2005 21:35 | 20 | 9/16/2005 21:45 | 5228.22 | 39.110 | 41 | 9.93 | 16 |
| 3/23/2005 12:05 | 121 | 3/23/2005 12:30 | 5116.96 | 38.277 | 42 | 1.75 | 51 |
| 10/24/2005 13:09 | 195 | 10/24/2005 14:45 | 5011.73 | 37.490 | 43 | 1.19 | 59 |
| 11/1/2005 14:55 | 104 | 11/1/2005 16:30 | 4448.18 | 33.275 | 44 | 2.43 | 50 |
| 3/27/2005 16:50 | 79 | 3/27/2005 17:00 | 3849.61 | 28.797 | 45 | 2.76 | 42 |
| 11/16/2005 4:10 | 464 | 11/16/2005 4:15 | 3767.29 | 28.181 | 46 | 4.48 | 31 |
| 3/23/2005 2:33 | 172 | 3/23/2005 2:45 | 3602.42 | 26.948 | 47 | 1.74 | 52 |
| 2/16/2005 7:00 | 84 | 2/16/2005 7:15 | 3595.93 | 26.899 | 48 | 2.45 | 48 |
| 6/28/2005 18:10 | 54 | 6/28/2005 18:15 | 3126.97 | 23.391 | 49 | 7.93 | 20 |
| 8/26/2005 20:50 | 34 | 8/26/2005 21:00 | 2914.16 | 21.799 | 50 | 4.83 | 28 |
| 10/21/2005 7:15 | 35 | 10/21/2005 7:30 | 2856.47 | 21.368 | 51 | 3.02 | 40 |
| 6/3/2005 8:55 | 30 | 6/3/2005 9:15 | 2704.69 | 20.232 | 52 | 2.73 | 43 |
| 4/20/2005 19:20 | 244 | 4/20/2005 19:45 | 2552.97 | 19.097 | 53 | 1.46 | 57 |
| 5/7/2005 12:15 | 84 | 5/7/2005 13:30 | 2521.62 | 18.863 | 54 | 3.26 | 38 |
| 10/25/2005 14:35 | 228 | 10/25/2005 17:45 | 2504.81 | 18.737 | 55 | 0.88 | 64 |
| 4/1/2005 19:25 | 59 | 4/1/2005 20:15 | 2485.44 | 18.592 | 56 | 0.99 | 63 |
| 9/26/2005 6:00 | 234 | 9/26/2005 9:45 | 2308.30 | 17.267 | 57 | 1.55 | 54 |
| 12/25/2005 10:55 | 127 | 12/25/2005 12:45 | 1949.52 | 14.583 | 58 | 1.50 | 56 |
| 11/8/2005 14:50 | 34 | 11/8/2005 15:15 | 1749.90 | 13.090 | 59 | 1.51 | 55 |
| 5/20/2005 3:10 | 329 | 5/20/2005 8:30 | 1599.08 | 11.962 | 60 | 1.17 | 60 |
| 9/23/2005 2:50 | 19 | 9/23/2005 3:00 | 1092.09 | 8.169 | 61 | 2.46 | 47 |
| 10/26/2005 7:25 | 103 | 10/26/2005 7:30 | 766.17 | 5.731 | 62 | 1.07 | 62 |
| 3/24/2005 9:40 | 15 | 3/24/2005 9:45 | 657.97 | 4.922 | 63 | 1.46 | 58 |
| 6/14/2005 19:10 | 29 | 6/14/2005 19:30 | 653.11 | 4.886 | 64 | 1.09 | 61 |
| 4/30/2005 4:45 | 127 | 4/30/2005 6:45 | 536.97 | 4.017 | 65 | 0.76 | 65 |
| 4/3/2005 1:45 | 274 | 4/3/2005 2:00 | 461.07 | 3.449 | 66 | 0.52 | 66 |
| 3/20/2005 7:10 | 14 | 3/20/2005 7:15 | 232.17 | 1.737 | 67 | 0.46 | 67 |
| 5/14/2005 9:25 | 11 | 5/14/2005 9:30 | 63.13 | 0.472 | 68 | 0.18 | 68 |
| 6/17/2005 1:26 | 12 | 6/17/2005 1:30 | 54.95 | 0.411 | 69 | 0.12 | 69 |
| 4/27/2005 0:27 | 10 | 4/27/2005 0:35 | 30.97 | 0.232 | 70 | 0.06 | 70 |

# Region 1

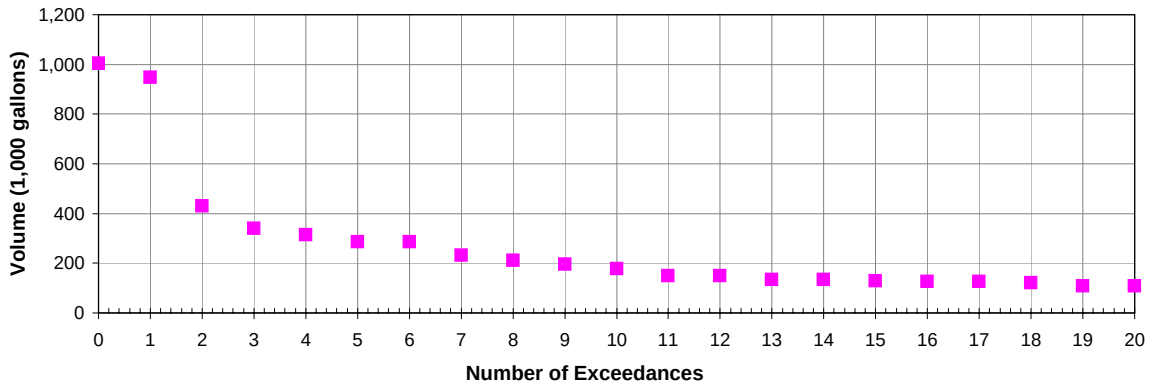
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 005LS39 |
| **Location Name** | Olympia Street |
| **Model ID** | ADC 005LS39-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005LS39 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

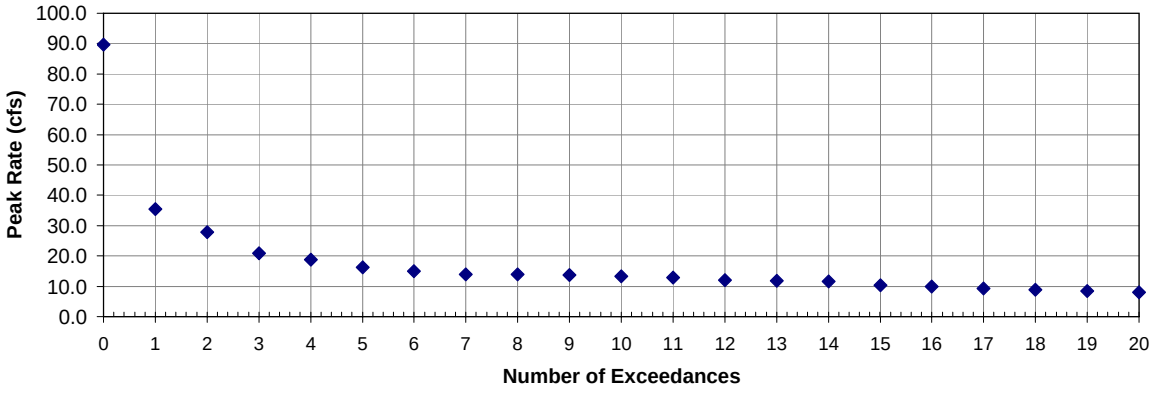
**Results Summary**

| | |
|---|---|
| Number of Events: | 71 |
| Peak Volume: | 134,179 $ft^3$ |
| | 1.00 MG |
| Total Volume: | 1,027,005 $ft^3$ |
| | 7.68 MG |
| Peak Rate: | 89.70 cfs |

### Figure 1 - Outfall 005LS39 CSO Volume




### Figure 2 - Outfall 005LS39 CSO Peak Flow Rate



## D.28.2 OLYMPIA, SHALER, AND WOODRUFF STREETS SEWERSHED – OLYMPIA STREET – NPDES# 005LS39

### Description of Outfall

Outfall 005LS39 conveys overflows from the ALCOSAN diversion chamber S-39 to Saw Mill Run, and ultimately into the Ohio River. The outfall is located along Saw Mill Run, north of Woodruff Street. The Olympia, Shaler, and Woodruff Streets Sewershed consist of 422 acres of residential, business and commercial users. The Olympia, Shaler and Woordruff Sewersheds are comprised of approximately 316 manholes and 85,283 linear feet (16.2 miles) of mostly combined sewer up to 48 inches in diameter. The 005LS39 Sewershed (Olympia St.) consists of 102 acres, or approximately 24% of the total service area.

*Attachment 1, Tributary Area Map,* shows the CSO location and the tributary area.

Outfall 005LS39 typically experiences 71 overflow events during the Typical Year Baseline Condition simulation. The maximum overflow volume during the typical year baseline conditions simulation (2005) discharging from outfall 005LS39 is approximately 1.00 MG. The peak overflow rate during the typical year baseline conditions simulation (2005) discharging from outfall 005LS39 is approximately 89.70 CFS. *Figure 1 – Outfall 005LS39 CSO Volume* and *Figure 2 – Outfall 005LS39 CSO Peak Overflow Rate* illustrate the CSO volume and peak flow characteristics of the 21 largest CSO events during the typical year baseline conditions simulation.

There appears to be a limited amount of available space for potential storage or treatment facilities in the vicinity of outfall 005LS39, adjacent to Saw Mill Run Boulevard in an existing parking facility upstream of the outfall. The site is generally bounded by Saw Mill Run Boulevard to the south, steep slopes to the north and private development to the east and west.

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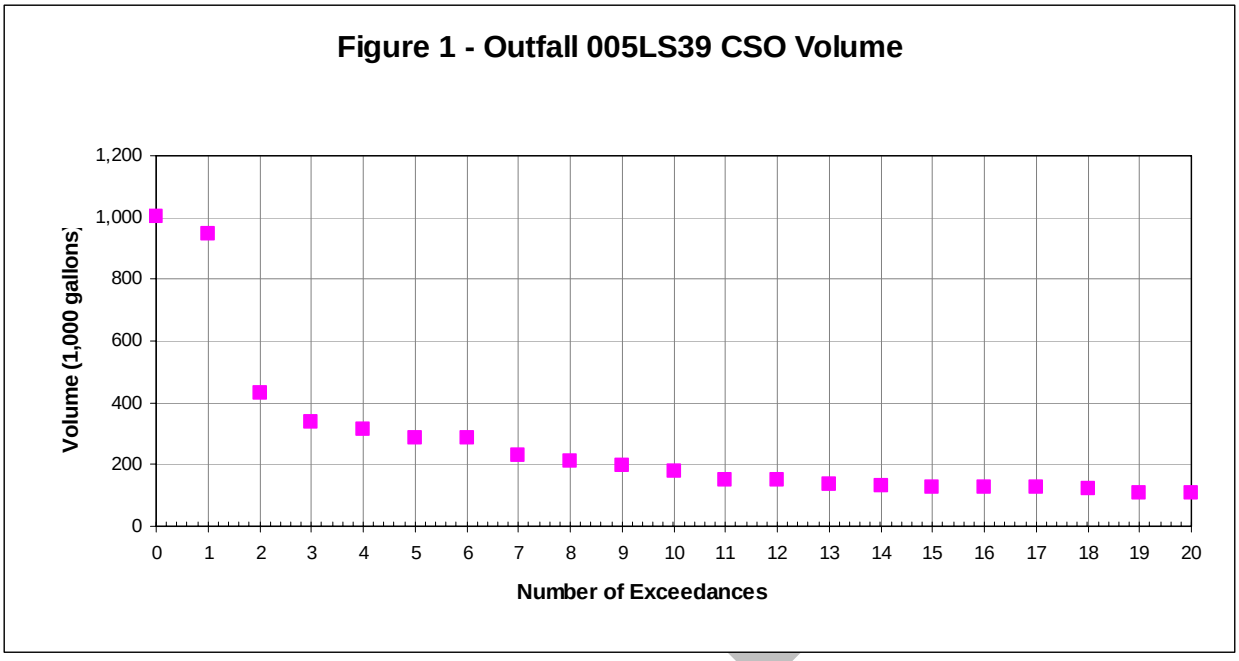


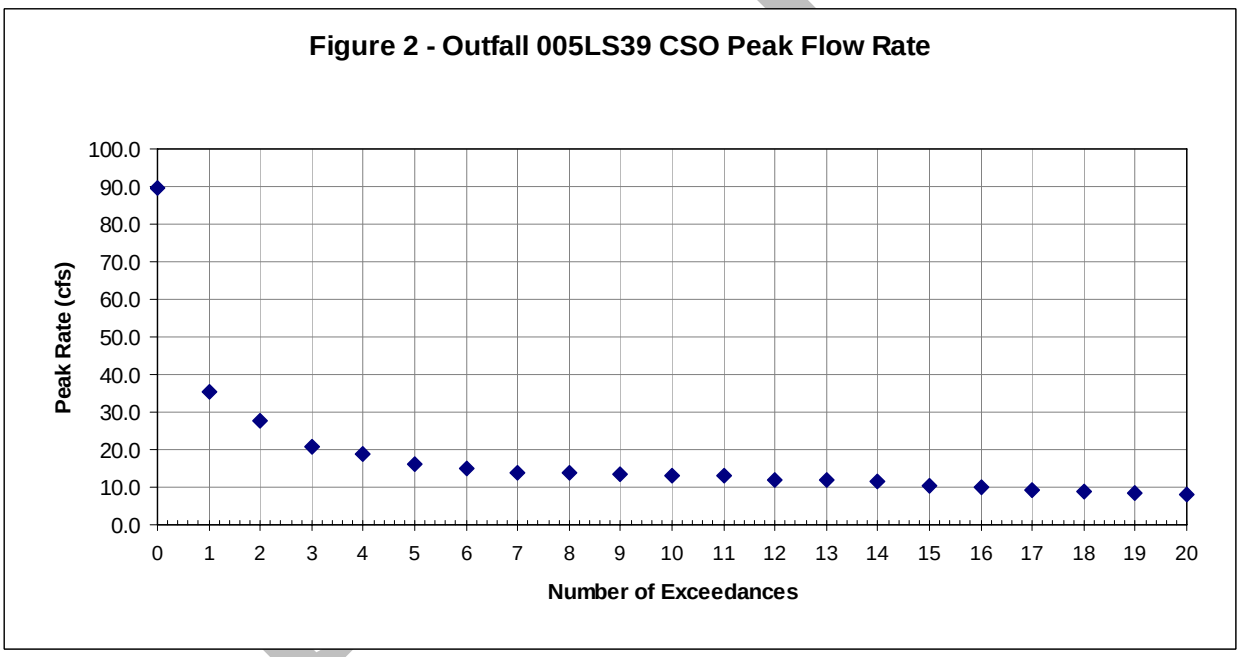


## Description of Alternatives

*Attachment 2 - CSO Alternatives Development Worksheet*, summarizes the results of the initial screening of technologies for their applicability to the control of CSO discharges from Outfall 005LS39. Attachment 2 identifies the alternatives that have been brought forward to be included

in this more detailed evaluation. The following paragraphs describe these CSO control alternatives in more detail.

***Collection System Control Alternatives***

CS4-005LS39: Sewer Separation

- Perform complete sewer separation of the tributary area. The separation of sanitary and storm sewers such that the drainage area is served by independent sanitary and stormwater sewer systems would reduce the hydraulic loading to the outfall. By definition, the complete separation of sewers would result in the elimination of all CSOs at the outfall.

***Storage Alternatives***

S2-005LS39: Sub-Surface Storage

- Construct below grade storage unit, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Sub-surface storage methods typically consist of closed concrete tanks, and are also equipped with a pump station and odor control measures.

S4-005LS39: Surface Storage

- Construct an above grade storage facility, in combination with a screening unit, to temporarily store CSO waters. Stored flows from the facility are slowly reintroduced into the collection and conveyance system after the storm event concludes and the system equalizes. Surface storage facilities methods typically consist of open concrete tanks and earthen basins, and are also equipped with a pump station and odor control measures.

***Treatment Alternatives***

T1-005LS39: Suspended Solids Control

- Construct a suspended solids control unit, in combination with screening and disinfection units to significantly reduce the quantities of floatables, coarse solids, suspended solids and

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pathogens discharged into the receiving waters. Swirl concentrators / vortex separators are typically utilized. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T2-005LS39: High Rate End of Pipe Treatment (HREOP)

- Construct a high rate end of pipe unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Ballasted flocculation units are typically utilized in HREOP treatment facilities. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T3-005LS39: CSO Treatment Facility (CSOTF)

- Construct a CSOTF unit, in combination with screening and disinfection units, to significantly reduce the quantities of floatables, coarse solids, suspended solids and pathogens discharged into the receiving waters. Facilities are usually equipped with a pump station, screening facilities, disinfection technologies and odor control measures.

T4-005LS39: Screening and Disinfection

- Construct screening and disinfection facilities to significantly reduce the quantities of floatables, coarse solids and pathogens discharged into the receiving waters. Facilities are commonly equipped with a pump station and odor control measures.

**Alternative Evaluation Results**

The above alternatives were evaluated based on a combination of their economic, environmental, implementation and operational impacts over a range of CSO control levels corresponding to 0, 1, 2, 4 and 6 untreated overflows per year.

*Figure 3 – Outfall 005LS39 Alternative Costs*, illustrate the planning level present worth costs associated with each of the alternatives when sized for 0, 1, 2, 4 and 6 untreated overflows per year.

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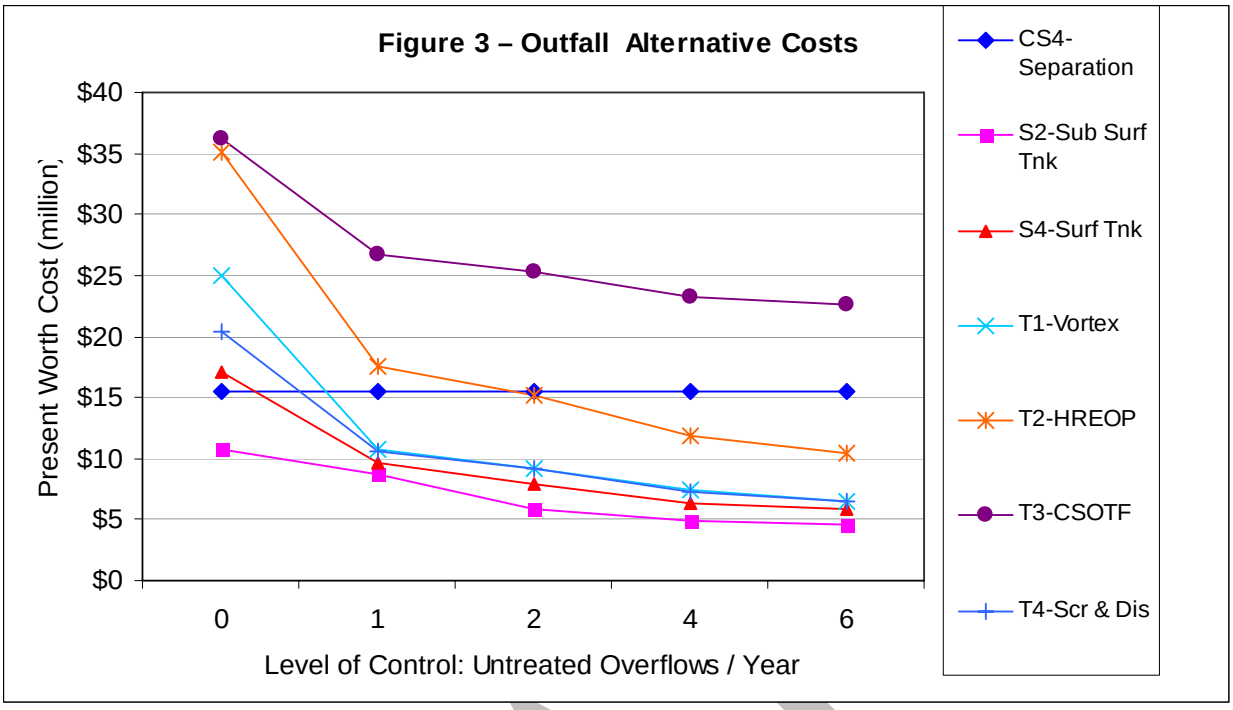


The alternative cost information was then pooled with the results of the environmental, implementation and operational impact analyses and PWSA-specific scaling and weighting factors to produce an overall "ranking" of each alternative at each control level.

*Attachment 3 – Alternative Scoring Sheet*, illustrates the composite scoring of economic, environmental, implementation and operational evaluation factors for control levels 0, 1, 2, 4 and 6 untreated overflows per year.

**Recommendations**

Based upon the above, for control levels 0 through 6, it is recommended that Alternative S2-005LS39: Sub-Surface Storage be carried forward and re-evaluated with the results of the regional and system-wide alternatives analyses.

*Attachment 4 – Facilities Boundary Map*, illustrates the estimated installation location of this recommended alternative.

**Significant Issues**

It appears that space is available for the construction of a sub-surface storage facility for all control levels.


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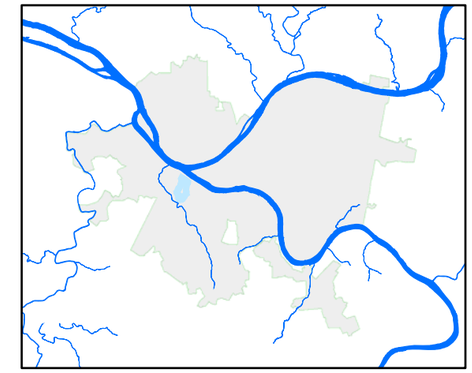

Area Overview

## Legend

- Sewershed Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Chamber
- Combined Sewer Outfall

500 0 500 Feet

# Attachment 1
# S-39
# Tributary Area Map
# Olympia Rd.
# Sewershed

CSO Controls Alternatives

PWSA THE PITTSBURGH WATER & SEWER AUTHORITY Quality Water Quality Service

SW-D-0226.pdf

Attachment 2 - CSO Alternatives Development Worksheet

| Technology | Considered Y or N | Comments |
|---|---|---|
| ***Source Control:*** | | |
| Sewer & Manhole Rehabilitation | N | The relatively small amount of groundwater abatement attainable will not provide adequate CSO control. |
| ***Collection System Controls:*** | | |
| Sewer system optimization | N | The amount of sewer system optimization available will not provide adequate CSO control. |
| Regulator optimization | N | Regulator optimization will not provide adequate CSO control. |
| Inter-basin flow balance / relief | N | Inter-basin flow balance/relief will be evaluated on a regional or system-wide basis only. |
| Sewer separation | Y | Sewer separation within the 102 acres of combined sewer area tributary to this outfall will be evaluated. |
| ***Storage:*** | | |
| In-line (existing unused conduits) | N | In-line storage will be not evaluated. |
| Sub-surface (tunnels, tanks, etc.) | Y | Sub-surface storage in conjunction with screening will be evaluated. |
| Surface (open tanks, earthen basins) | Y | Surface storage in conjunction with screening will be evaluated. |
| ***Treatment:*** | | |
| Suspended Solids Control (swirl/vortex) | Y | Swirl concentrators in conjunction with screening and disinfection will be evaluated. |
| Floatables & Coarse Solids Control (screens, nets, etc.) | Y | Screening will be evaluated in conjunction with storage and treatment alternatives. |
| Disinfection (chlorine, ozone, etc.) | Y | Disinfection will be evaluated in conjunction with treatment alternatives. |
| High rate end-of-pipe (ballasted floc) | Y | Ballasted flocculation treatment in conjunction with screening and disinfection will be evaluated. |
| CSO Treatment Facility (CSOTF) | Y | Detention and treatment in conjunction with screening and disinfection will be evaluated. |
| Sidestream Elevated Pool Aeration | N | Technology does not effectively treat the parameters of concern. |

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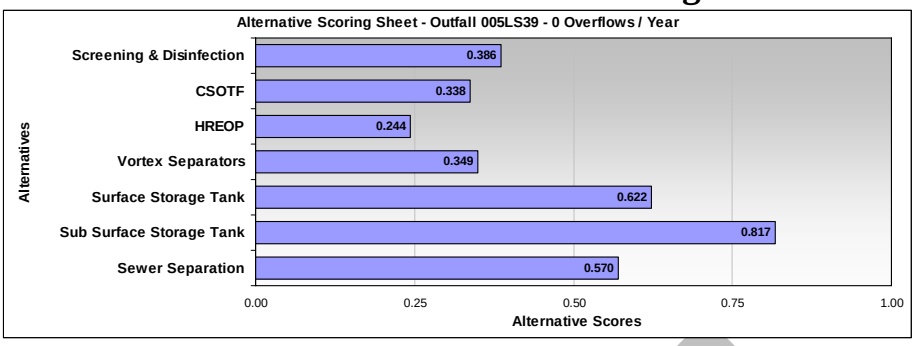
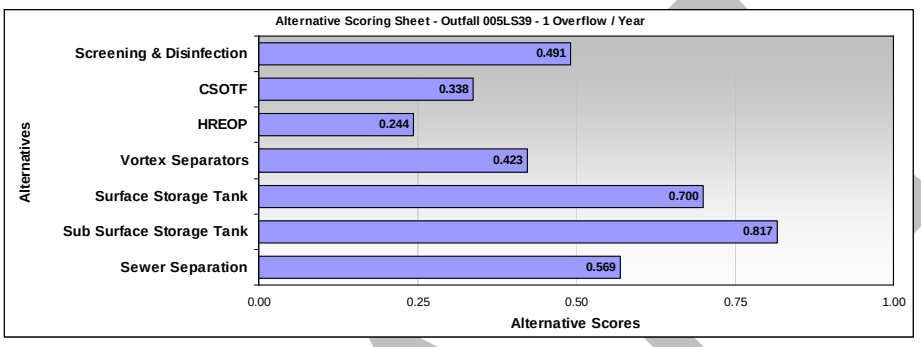
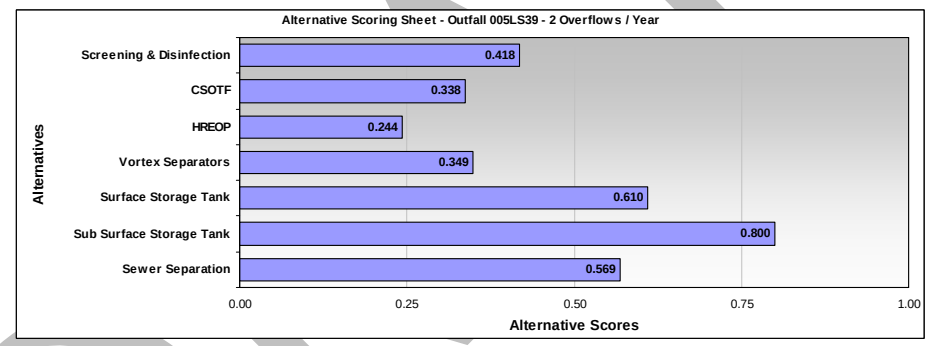
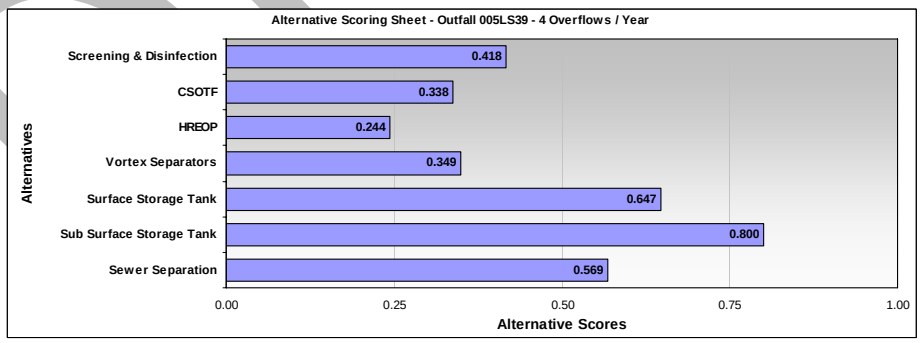
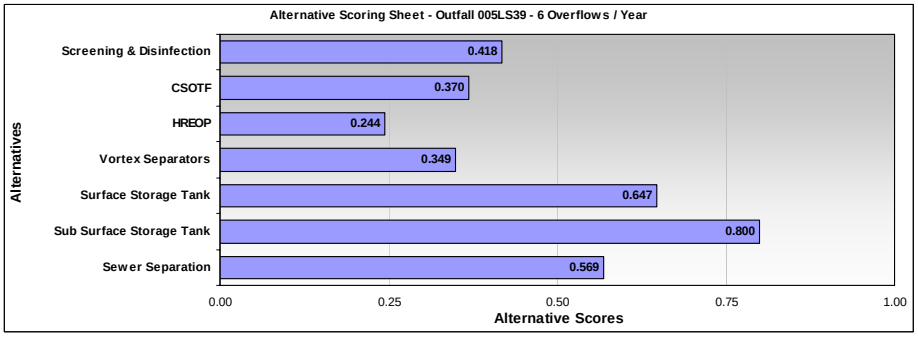
# Attachment 3 – Alternative Scoring Sheet

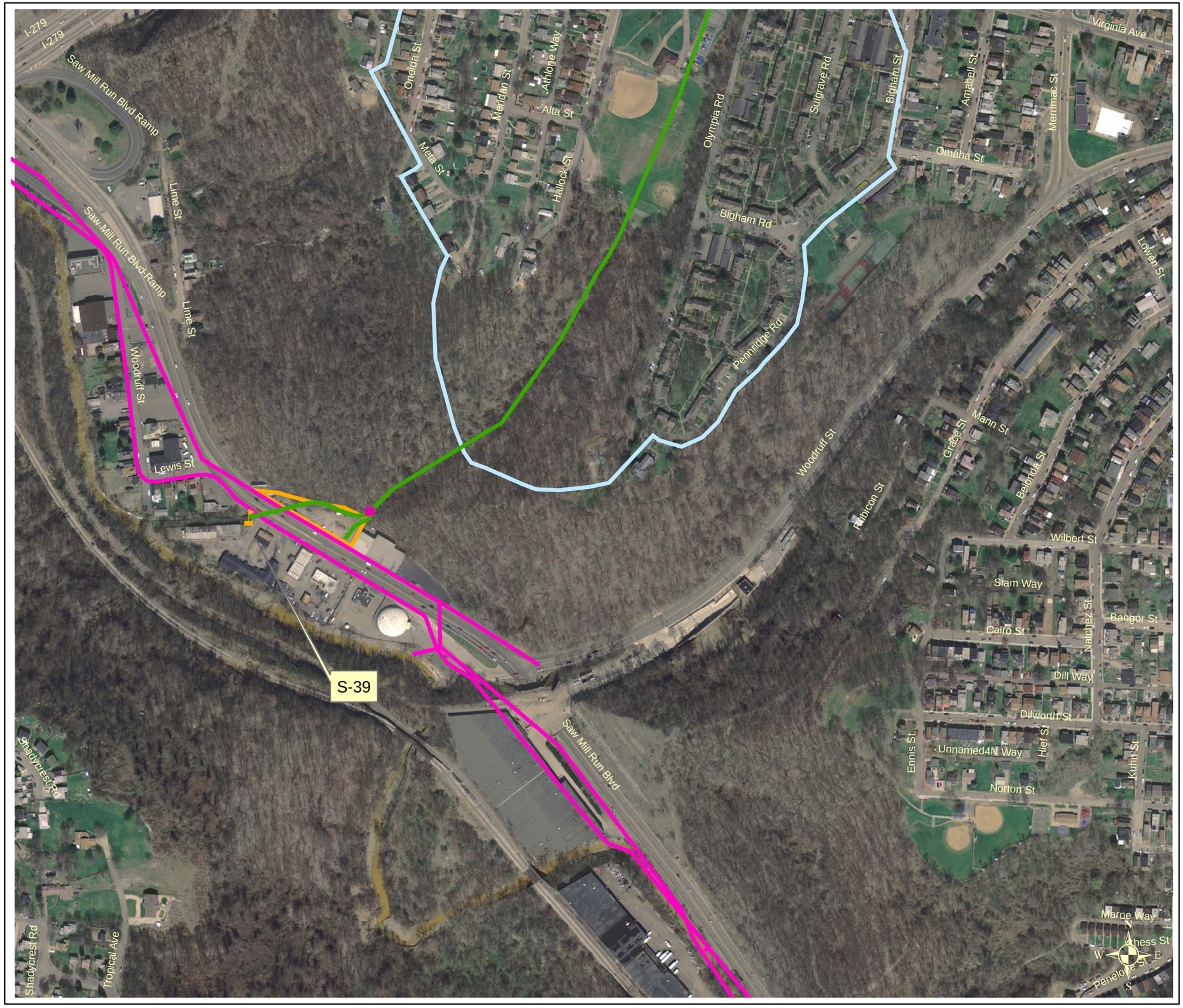


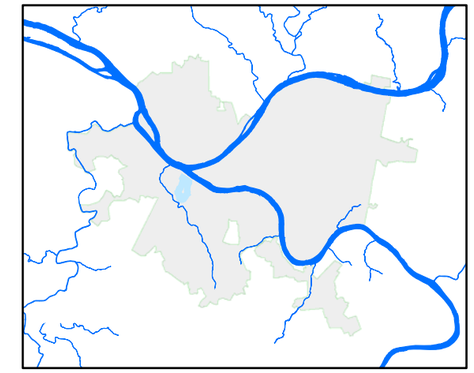





Area Overview

## Legend

- Sewershed Boundary
- Facilities Boundary
- ALCOSAN Interceptor
- Trunk Sewer
- ALCOSAN Diversion Chamber
- Combined Sewer Outfall

0 310 620 Feet

# Attachment 4
# S-39
# Facilities Boundary Map
# Olympia Rd.
# Sewershed

CSO Controls Alternatives

PWSA
THE PITTSBURGH WATER & SEWER AUTHORITY
Quality Water Quality Service

SW-D-0226.pdf

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 3 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 1 | 1 | 1 | 1 | 1 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 4 | 4 | 4 | 4 | 4 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed | 5 | 5 | 5 | 5 | 5 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 3 | 3 | 3 | 3 | 3 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 5 | 5 | 5 | 5 | 5 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | CS4-Separation | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 1 | 1 | 1 | 1 | 1 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 5 | 5 | 5 | 5 | 5 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | CS4-Separation | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 3 | 3 | 3 | 3 | 3 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S2-Sub Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 5 | 5 | 5 | 5 | 5 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 3 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 5 | 5 | 4 | 4 | 4 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 1 | 1 | 1 | 1 | 1 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 4 | 4 | 4 | 4 | 4 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | S4-Surf Tnk | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 5 | 5 | 5 | 5 | 5 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 4 | 4 | 4 | 4 | 4 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | S4-Surf Tnk | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | 4 | 3 | 3 | 3 | 3 |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | | | | | |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 2 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 2 | 2 | 2 | 2 | 2 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T1-Vortex | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T1-Vortex | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T2-HREOP | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 4 | 4 | 4 | 4 | 4 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 1 | 1 | 1 | 1 | 1 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 1 | 1 | 1 | 1 | 1 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 1 | 1 | 1 | 1 | 1 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T2-HREOP | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 3 | 3 | 3 | 3 | 3 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 2 | 2 | 2 | 2 | 2 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 2 | 2 | 2 | 2 | 2 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 1 | 1 | 1 | 1 | 1 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T3-CSOTF | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

Objective Scoring

| Alternative: | T3-CSOTF | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 1 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Yellow Box = Objective scores determined by PWSA / Consultant Team

Result of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Present Worth | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | PW Cost is more than 40% higher than the cost of the least expensive control alternative. | | | | | |
| 2 | High Cost | PW Cost is between 30% and 40% more than the cost of the least expensive control alternative. | | | | | |
| 3 | Moderate Cost | PW Cost is between 20% and 30% more than the cost of the least expensive control alternative. | 5 | 1 | 1 | 1 | 1 |
| 4 | Low Cost | PW Cost is between 10% and 20% more than the cost of the least expensive control alternative. | | | | | |
| 5 | Very Low Cost | PW Cost is within 10% of the cost of the least expensive control alternative. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Pollution Reduction | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Minimal Treatment | Provides minimal pollution reduction, with little or no reduction of TSS, bacteria etc. Applicable for floatables control and large screenings (clogs, debris etc.) | | | | | |
| 2 | Less than Primary Treatment | Some TSS removal or varying effectiveness of sediment removal. Less than sufficient handling of bacteria and/or floatables. Example, screening and disinfection facilities. Net result of sewer separation due to large increases of storm water pollutant loads compared to reduction of CSO. | | | | | |
| 3 | Primary Treatment | Meets EPA minimum treatment guidelines for CSO. Includes primary clarification, floatables / debris control and disinfection, if required. For example, CSOTF, vortex separation or increased primary tankage at WWTP | 2 | 2 | 2 | 2 | 2 |
| 4 | Primary to Secondary Treatment | Ensures at least minimum treatment per EPA guidelines with up to full secondary treatment at times. For example, deep storage tunnels and storage tanks capture, store and convey flow to WWTP where it receives at least primary and up to secondary treatment, per available capacity. Also, high rate end-of-pipe treatment can show greater than primary treatment levels. | | | | | |
| 5 | Secondary Treatment | Provides full secondary treatment for CSO at all times. For example, regulator modifications that send all flows to the WWTP. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Impact on Habitat, Stream, River etc. | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Extreme Negative Impact | Extreme reduction of natural habitat and/or stream flooding / erosion. Example: constructing large treatment facility with centralized effluent in natural resource habitat with streams, wildlife, etc. | | | | | |
| 2 | Mod Negative Impact | Reduces habitat acreage and/or increases stream bank erosion. Example: moderate sized storage / treatment facility (CSOTF and HREOP) in natural setting or sewer separation resulting in increased storm water flow and bank erosion. Also, alternatives that could discharge harmful chemical by-products, i.e. THMs | | | | | |
| 3 | No Impact | Alternative does not change habitat characteristics or increase erosion. Volume / frequency remain the same. For example, end-of-pipe treatment facilities such as vortex separators and screening and disinfection facilities. Include facilities without disinfection by-products located away from stream and natural habitats. | 3 | 3 | 3 | 3 | 3 |
| 4 | Mod Positive Impact | Alternative is not located in habitat and significantly reduces volume / frequency of wet weather flow in stream. For example, storage tanks or deep tunnels located outside of habitat. | | | | | |
| 5 | Positive Impact | Essentially eliminates flows and is not located in habitat. For example, storage / conveyance system that eliminates CSO. Also, alternative that increases habitat, such as wetlands constructed for treatment. | | | | | |

Objective Scoring

| Alternative: | T4-Scr & Dis | Objective Scoring: Constructability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Community Disruption | Construction activities producing extreme, sustained, widespread disruption to community. Large scale surface impacts that interrupt traffic / access and cause extreme levels of noise, odor, vibration or other inconveniences. Example: complete open-cut sewer separation in large, heavily populated area. Site specific | | | | | |
| 2 | Significant Community Disruption | Construction activities producing significant intermittent or short duration disruptions that result in interruption to traffic / access and cause significant levels of noise, odor, vibration or other inconveniences. For example, storage tank installation that requires significant excavation in heavily populated area. Site specific. | | | | | |
| 3 | Moderate Community Disruption | Construction activities producing moderate levels of noise, odor, vibration or other inconveniences over sustained periods of time and over large areas. For example, several drop shafts with mining pipe and material delivery in heavily populated area. Site specific. | 3 | 3 | 3 | 3 | 3 |
| 4 | Minimal Community Disruption | Construction activities producing minimal levels of noise, odor, vibration or other inconveniences over short periods of time in limited areas. For example, regulator modifications involving short periods of excavation. Site specific. | | | | | |
| 5 | No Community Disruption | Alternative construction produces no contributions to noise, odor, vibration or other inconveniences. For example, adjustment to fixed weir or automatic gate that does not require excavation. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Permanent Land Requirement | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extreme Land Requirement | Alternative has extreme permanent land requirement. For example, construction of a surface storage tank would require a large amount of land. | | | | | |
| 2 | Large Land Requirement | Alternative has large permanent land requirement. For example, construction of a sub-surface storage tank could require a lesser amount of land if the surface of the tank could be used for parking or some other activity. | | | | | |
| 3 | Moderate Land Requirement | Moderate permanent land requirement. Example: construction of tunnel storage requires access shafts and other appurtenances that in total, would use less land than other storage methods. | 3 | 3 | 3 | 3 | 3 |
| 4 | Small Land Requirement | Alternative has small permanent land requirement. For example, construction of screening and disinfection facilities only. Typically includes sewer separation due to construction within exising easements. | | | | | |
| 5 | No Land Requirement | Alternative has no permanent land requirement. For example, adjustment to fixed weir or automatic gate that does not require construction of additional facilities. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Public Acceptance | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Strong Public Opposition | Alternative would likely result in major opposition. For example, open storage tanks in residential areas. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |
| 3 | No Public Reaction | Alternative has no significant history of opposition. For example, collection system optimization and most treatment alternatives. Post construction consideration. Assume some type of CSO control to be constructed. | 3 | 3 | 3 | 3 | 3 |
| 5 | Strong Public Support | Alternative would be embraced by the public over others. May include site enhancement such as a park over a sub-surface tank. Post construction consideration. Assume some type of CSO control to be constructed. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Institutional Constraints | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Not in PWSA Jurisdiction | Not located within PWSA owned sewer system. Example: source controls and collection system controls in outlying municipalities. | | | | | |
| 3 | Shared Jurisdiction | PWSA relief sewer that also requires local relief sewers or ALCOSAN WWTP expansion. | 5 | 5 | 5 | 5 | 5 |
| 5 | PWSA Jurisdiction | Storage, treatment and collection systems within the PWSA owned sewer system; real-time controls, regulator modifications. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Siting Restrictions | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Difficult Req's | Requires extensive approval process involving permitting / acceptance effort. Example: emerging technology (i.e. ballasted flocculation) with little installation history, may require pilot facilities and studies. Also, an alternative which requires a series of wetland, architectural and community permits. Example: traffic permitting for a large open-cut relief sewer in Oakland. | 3 | 3 | 3 | 3 | 3 |
| 3 | Moderate Req's | Normal review & approval process requiring minimal permits. Example: a tunnel located w/in existing right-of-ways, requiring plan review/ approval from <three authorities. | | | | | |
| 5 | No Req's | No permits required. Example: expanding existing PWSA facilities, such as raising weirs. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Operating Complexity | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| Baseline Score | Metric | Example / Explanation | 0 OF | 1 OF | 2 OF | 4 OF | 6 OF |
| 1 | Extremely Complex; Req's Significant Trng and/or Staff | Example: High rate end-of-pipe treatment alternatives. | | | | | |
| 2 | Difficult to Operate; Req's Specific Trng | Example: elaborate real-time control alternatives. Vortex separators. | | | | | |
| 3 | Moderately Complex; Req's General Trng | Example: CSO treatment facility or screening and disinfection facilities. | 3 | 3 | 3 | 3 | 3 |
| 4 | Simple to Operate; Req's Limited Trng | Example: Storage / conveyance tunnels with pump station. | | | | | |
| 5 | Little or No O&M Required | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Flexibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Cannot be Exp. for Add'l CSO Control | Example: Storage / treatment facility located on site with no available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | | | | | |
| 3 | May be Exp. on Ltd Basis, w/ Some Difficulty | Example: Storage / treatment facility located on site with available adjacent land for expansion. Site restrictions and ease of facility expansion to be considered. | 3 | 3 | 3 | 3 | 3 |
| 5 | Could be Easily Expanded | Example: Real-time control located in a conveyance system with available capacity. Site restrictions and ease of facility expansion to be considered. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Reliability | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | History of Significant Problems / Ltd Track Record | Example: High rate end-of-pipe alternatives. | | | | | |
| 3 | Mod Reliable, Req's Routine Maint. & Repair | Example: CSO treatment facilities. Most other treatment units. | 3 | 3 | 3 | 3 | 3 |
| 5 | Minimum Maint with Proven Track Record | Example: Storage tanks tunnels. Also includes separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Compatibility | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | No PWSA Experience | Example: High rate end-of-pipe alternatives. | | | | | |
| 2 | Very little PWSA Exp | Example: End of pipe CSO Treatment Facility such as detention and treatment, swirl separators and screening and disinfection units. | | | | | |
| 3 | Limited PWSA Experience | Example: Sub-surface storage tanks and tunnels. | 2 | 2 | 2 | 2 | 2 |
| 4 | Moderate PWSA Exp | Example: Above greade storage faccilities. | | | | | |
| 5 | Extensive PWSA Exp | Example: Sewer separation and regulator optimization. | | | | | |

| Alternative: | T4-Scr & Dis | Objective Scoring: Annual O&M | Actual Scores | | | | |
|---|---|---|---|---|---|---|---|
| **Baseline Score** | **Metric** | **Example / Explanation** | **0 OF** | **1 OF** | **2 OF** | **4 OF** | **6 OF** |
| 1 | Very High Cost | Annual O&M Cost is more than 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 2 | High Cost | Annual O&M Cost is between 10% and 20% higher than the average Annual O&M Cost for all Alternatives. | | | | | |
| 3 | Moderate Cost | Annual O&M Cost is within +/-10% of the average Annual O&M Cost for all Alternatives. | 2 | 2 | 2 | 2 | 2 |
| 4 | Low Cost | Annual O&M Cost is between 10% and 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |
| 5 | Very Low Cost | Annual O&M Cost is more than 20% lower than the average Annual O&M Cost for all Alternatives. | | | | | |

Box = Objective scores determined by PWSA / Consultant Team

of Input: Used in calculation of Subjective and Total Scores in Sheet 2.

Total Score

| Alternative: | CS4-Separation | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.112 | 0.017 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.643** |

| Alternative: | CS4-Separation | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | CS4-Separation | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

| Alternative: | CS4-Separation | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 1 | 0.00 | 0.062 | 0.000 |
| Permanent Land Requirement | 4 | 0.85 | 0.042 | 0.036 |
| Public Acceptance | 5 | 1.00 | 0.053 | 0.053 |
| Institutional Constraints | 3 | 0.50 | 0.033 | 0.017 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 5 | 1.01 | 0.078 | 0.079 |
| Flexibility | 1 | 0.00 | 0.053 | 0.000 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 5 | 1.00 | 0.042 | 0.042 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.569** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.817** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

| Alternative: | S2-Sub Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 3 | 0.50 | 0.042 | 0.021 |
| Annual O&M | 5 | 1.00 | 0.128 | 0.128 |
| | | | **Sum Total:** | **0.800** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 4 | 0.75 | 0.128 | 0.096 |
| | | | **Sum Total:** | **0.769** |

| Alternative: | S4-Surf Tnk | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 3 | 0.50 | 0.147 | 0.074 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 5 | 1.00 | 0.108 | 0.108 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.663** |

| Alternative: | S4-Surf Tnk | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

Total Score

| Alternative: | S4-Surf Tnk | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

| Alternative: | S4-Surf Tnk | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 4 | 0.85 | 0.108 | 0.092 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 1 | 0.00 | 0.053 | 0.000 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 4 | 0.82 | 0.078 | 0.064 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 5 | 1.00 | 0.102 | 0.102 |
| Compatibility | 4 | 0.75 | 0.042 | 0.032 |
| Annual O&M | 3 | 0.50 | 0.128 | 0.064 |
| | | | **Sum Total:** | **0.573** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 2 | 0.25 | 0.147 | 0.037 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.386** |

| Alternative: | T1-Vortex | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T1-Vortex | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

| Alternative: | T1-Vortex | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 2 | 0.12 | 0.078 | 0.009 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.349** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T2-HREOP | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

| Alternative: | T2-HREOP | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 4 | 0.92 | 0.112 | 0.103 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 1 | 0.01 | 0.078 | 0.001 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 1 | 0.00 | 0.102 | 0.000 |
| Compatibility | 1 | 0.00 | 0.042 | 0.000 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.244** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T3-CSOTF | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

| Alternative: | T3-CSOTF | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 3 | 0.90 | 0.112 | 0.101 |
| Impact on Habitat, River, Stream etc. | 2 | 0.15 | 0.108 | 0.016 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 2 | 0.15 | 0.042 | 0.006 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 1 | 0.00 | 0.040 | 0.000 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 1 | 0.00 | 0.128 | 0.000 |
| | | | **Sum Total:** | **0.338** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 0 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 5 | 1.00 | 0.147 | 0.147 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.565** |

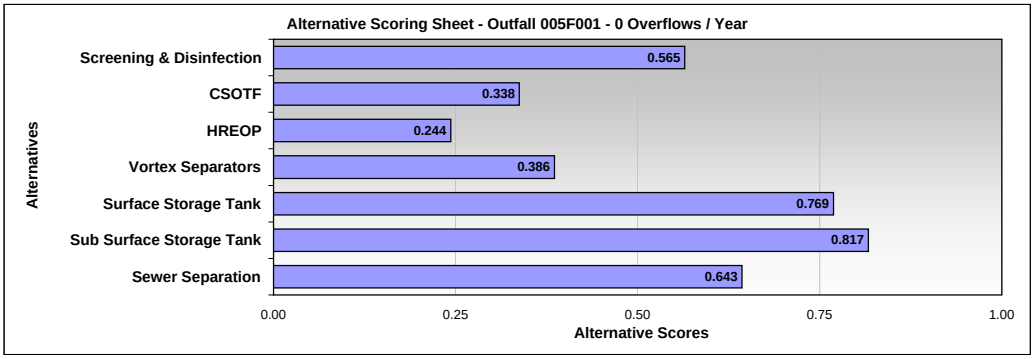
| Alternative: | T4-Scr & Dis | | Control Level: | 1 Overflow / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

| Alternative: | T4-Scr & Dis | | Control Level: | 2 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

Total Score

| Alternative: | T4-Scr & Dis | | Control Level: | 4 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |

| Alternative: | T4-Scr & Dis | | Control Level: | 6 Overflows / Year |
|---|---|---|---|---|
| | Objective Score | Subjective Score | Weighting Factor | Weighted Subj. Score |
| Present Worth Cost | 1 | 0.00 | 0.147 | 0.000 |
| Pollution Reduction | 2 | 0.68 | 0.112 | 0.077 |
| Impact on Habitat, River, Stream etc. | 3 | 0.50 | 0.108 | 0.054 |
| Constructability | 3 | 0.50 | 0.062 | 0.031 |
| Permanent Land Requirement | 3 | 0.50 | 0.042 | 0.021 |
| Public Acceptance | 3 | 0.50 | 0.053 | 0.027 |
| Institutional Constraints | 5 | 1.00 | 0.033 | 0.033 |
| Siting Restrictions | 3 | 0.50 | 0.040 | 0.020 |
| Operating Complexity | 3 | 0.45 | 0.078 | 0.035 |
| Flexibility | 3 | 0.50 | 0.053 | 0.027 |
| Reliability | 3 | 0.50 | 0.102 | 0.051 |
| Compatibility | 2 | 0.25 | 0.042 | 0.011 |
| Annual O&M | 2 | 0.25 | 0.128 | 0.032 |
| | | | **Sum Total:** | **0.418** |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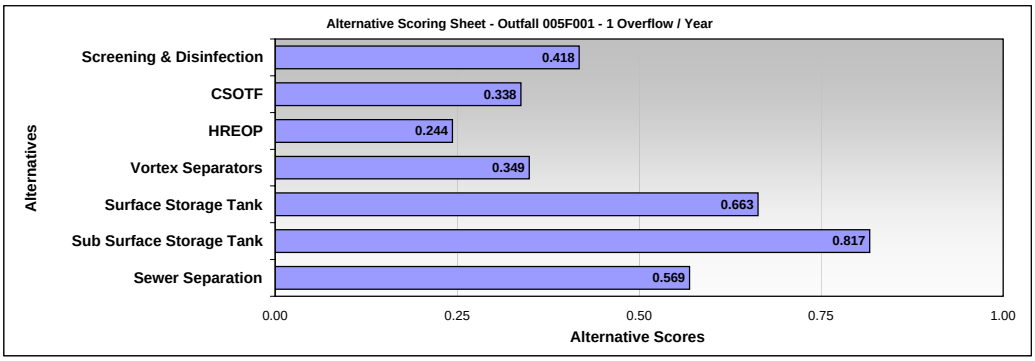
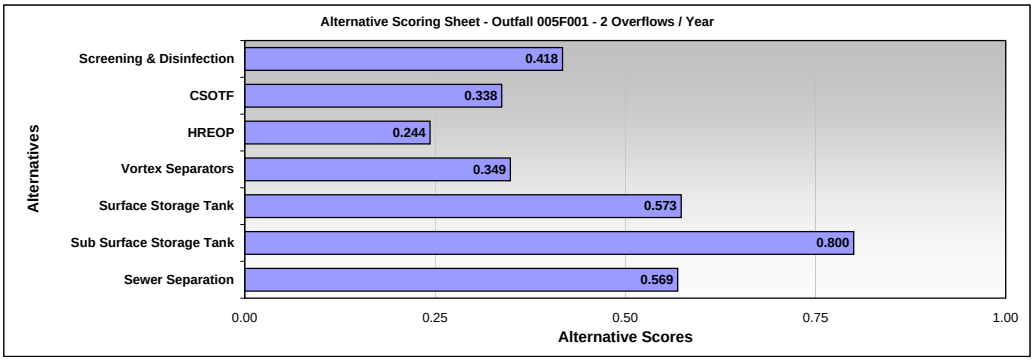
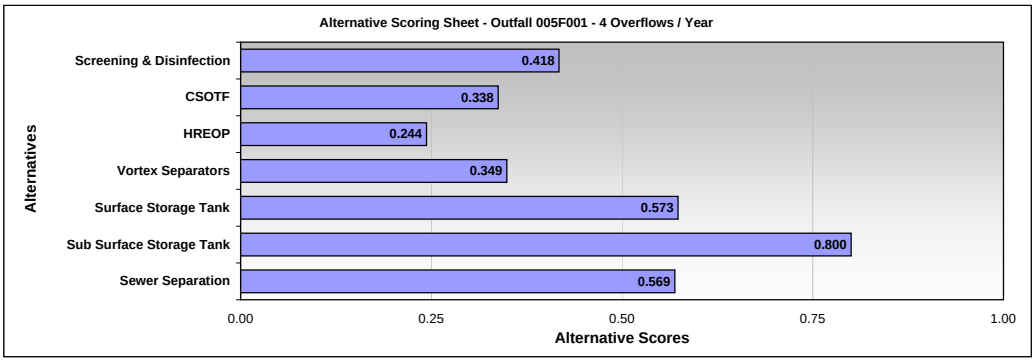
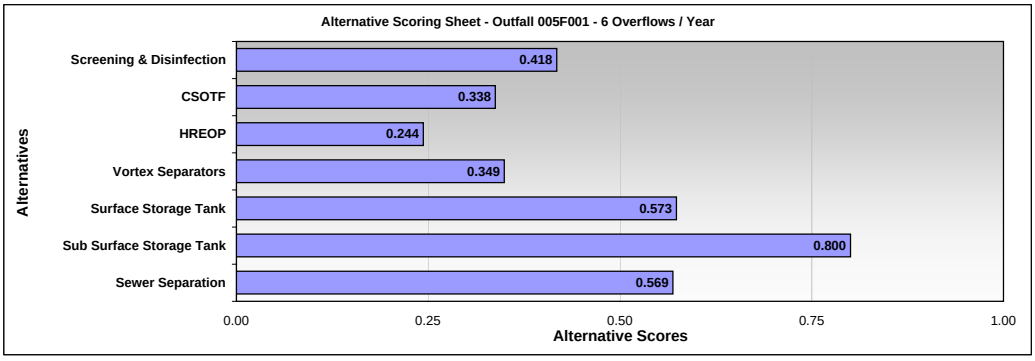
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.565
0.338
0.244
0.386
0.769
0.817
0.643
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005F001 - 1 Overflow / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.663
0.817
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005F001 - 2 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005F001 - 4 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores


Alternative Scoring Sheet - Outfall 005F001 - 6 Overflows / Year
Alternatives
Screening & Disinfection
CSOTF
HREOP
Vortex Separators
Surface Storage Tank
Sub Surface Storage Tank
Sewer Separation
0.418
0.338
0.244
0.349
0.573
0.800
0.569
0.00
0.25
0.50
0.75
1.00
Alternative Scores

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 0 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 79 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **11,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,412 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **69,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **11,958,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Tank Parameters** | | | | | |
| Storage Type (1=Surface; 2=Subsurface) | | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | | 1.28 | | 172,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | | 1.51 | | 202,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | | 143 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | | 96 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | | 1.54 | | 205,920 | **Sufficient Volume** |
| Tank Area (SF) | | 14,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | | **1,238,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | | 21.99 | | 34.03 | = Peak Rate |
| Force Main Diameter (In) | | 32 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,334,000** | **$** | **40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 34.03 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 303,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,520 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control)** | **$** | **127,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 21.99 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,430,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | | |
| Passes / Detention (Min) | | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ | - | $ | - | |
| **Construction Cost (Disinfection)** | **$** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Tank (SF) | | 38,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **76,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **7,368,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 0 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 1.28 | | 172,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 1.51 | | 202,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 143 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 96 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 1.54 | | 205,920 | **Sufficient Volume** |
| Tank Area (SF) | 14,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **4,868,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 1.28 | | 1.99 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 8 | | | Input by Engineer |
| Force Main Velocity (FPS) | 5.7 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$ 1,376,000** | | **$ 18,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 34.03 | | | Ref: Technical Parameters |
| Diameter (In) | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$ 84,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 303,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 15,150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$ 770,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 21.99 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$ 1,430,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes / Detention (Min) | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) | $ - | | $ - | |
| **Construction Cost (Disinfection)** | **$ -** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$ 39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 38,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) | $ 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$ 76,000** | | | |
| | | **TOTAL CAPITAL COST** | **$** | **8,661,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 21.99 | | 34.03 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | 35 | | Diameter OK | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 3 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **1,995,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | Typ 1, Rev as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 24.19 | | 37.43 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.9 | | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,603,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 34.03 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 87,000 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 4,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **290,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 21.99 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,430,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 24.19 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 78 | | 37 | |
| Passes / Detention (Min) | | 3 | | 15.42 | Ref: Tech Param-15 min minimum |
| | | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **826,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | Typ=# Regs, Rev Qty as Req'd |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 23,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **9,615,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 0 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 21.99 | 34.03 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 3,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 87 | OK | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 44 | Area OK | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | Ratio OK | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | Typ 12, Rev as Req'd |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.34 | 45,936 | |
| **Construction Cost (CSOTF)** | **$** | **16,371,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | Typ 1, Adjust as Req'd Ref: Tech Par |
| Dewatering Pumping Rate (MGD / CFS) | | 21.99 | 34.03 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 32 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | Check: | OK - Velocity >2 fps/< 10 fps |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,334,000** | **$ 40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 34.03 | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 69,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 3,450 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **242,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | | 21.99 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,430,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | Typ 1, Rev as Req'd |
| Peak Flow (MGD) | | 21.99 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 74 | 35 | |
| Passes / Detention (Min) | | 3 | 15.22 | Ref: Tech Param-15 min minimum |
| | | | OK Detn Time | |
| **Construction Cost (Disinfection)** | **$** | **784,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | Modify Regulator | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 14,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **28,000** | | |
| **TOTAL CAPITAL COST** | **$** | | | **23,352,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 0 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 21.99 | | 34.03 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 260 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 24 | | **OK** | Input by Engineer |
| Width (Ft) | | 12 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **4,680,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 24.19 | | 37.43 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 34 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.9 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,603,000** | **$** | **42,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 34.03 | | | Ref: Technical Parameters |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 7,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **40,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 21.99 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,430,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 24.19 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 78 | | 37 | Input by Engineer |
| Passes / Detention (Min) | | 3 | | **15.42** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 826,000 | $ | 708,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,534,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 32,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **64,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **12,516,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 0 | |
| Peak Volume | 171,654 | CF |
| | 1.28 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 34.03 | CFS |
| | 21.99 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 0 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 21.99 | | 34.03 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **1,430,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 21.99 | | 34.03 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 32 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **4,334,000** | **$** | **40,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 34.03 | | | Ref: CSO Statistics |
| Diameter (In) | | 48 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **84,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 6,800 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 340 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **39,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 21.99 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 74 | | 35 | |
| Passes / Detention (Min) | | 3 | | **15.22** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 784,000 | $ | 660,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,444,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 25,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| **TOTAL CAPITAL COST** | | | **$** | | **7,460,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 1 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 79 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **11,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,412 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **69,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 11,958,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.39 | | 53,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.46 | | 62,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 80 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 53 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.48 | | 63,600 | **Sufficient Volume** |
| Tank Area (SF) | 4,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **342,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 12.58 | | 19.47 | = Peak Rate |
| Force Main Diameter (In) | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **3,187,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 19.47 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 93,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 470 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **51,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 12.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **995,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 25,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **50,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,759,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 1 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.39 | | 53,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.46 | | 62,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 80 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 53 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.48 | | 63,600 | **Sufficient Volume** |
| Tank Area (SF) | 4,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **2,127,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.39 | | 0.61 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 4 | | | Input by Engineer |
| Force Main Velocity (FPS) | 7.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **619,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 19.47 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 93,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 4,650 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **305,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 12.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **995,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 25,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **50,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,212,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 1 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.58 | 19.47 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.84 | 21.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 26 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 5.8 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,340,000** | **$ 34,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 19.47 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 12.58 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **995,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 13.84 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | 28 | |
| Passes | | 3 | **15.43** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **624,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 13,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **26,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 5,381,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.58 | | 19.47 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 2,100 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 66 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 33 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.20 | | 26,136 | |
| **Construction Cost (CSOTF)** | **$** | **16,379,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 12.58 | | 19.47 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,187,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 19.47 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 39,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,950 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **154,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 12.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **995,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 12.58 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 56 | | 27 | |
| Passes | | 3 | | **15.53** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **599,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - CSOTF (SF) | | 10,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **20,000** | | | |
| **TOTAL CAPITAL COST** | **$** | | | | **21,468,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 1 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 12.58 | | 19.47 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 150 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 18 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **3,180,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 13.84 | | 21.42 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 26 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 5.8 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,340,000** | **$** | **34,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 19.47 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 4,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 12.58 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **995,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 13.84 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 59 | | 28 | Input by Engineer |
| Passes | | 3 | | **15.43** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 624,000 | $ | 500,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,124,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 28,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **56,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **8,857,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 1 | |
| Peak Volume | 52,659 | CF |
| | 0.39 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 19.47 | CFS |
| | 12.58 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 1 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 12.58 | | 19.47 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **995,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 12.58 | | 19.47 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 24 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **3,187,000** | **$** | **32,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 19.47 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,900 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **26,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 12.58 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 56 | | 27 | |
| Passes | | 3 | | **15.53** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 599,000 | $ | 473,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,072,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 24,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **48,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **5,462,000** | | | |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 2 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 79 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **11,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,412 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **69,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **11,958,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.19 | | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.22 | | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 57 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 38 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.24 | | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **155,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 10.15 | | 15.71 | = Peak Rate |
| Force Main Diameter (In) | 22 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,821,000** | **$** | **30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.71 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 47,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 240 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **30,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 10.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **882,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **4,064,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 2 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.19 | | 26,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.22 | | 31,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 57 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 38 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.24 | | 32,490 | **Sufficient Volume** |
| Tank Area (SF) | 2,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,503,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.19 | | 0.30 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 3 | | | Input by Engineer |
| Force Main Velocity (FPS) | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **447,000** | **$** | **14,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 15.71 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 47,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 2,350 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **179,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 10.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **882,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 22,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **44,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,171,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 2 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 10.15 | 15.71 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 11.17 | 17.28 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 23 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,908,000** | **$ 31,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.71 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 10.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **882,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 11.17 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 53 | 25 | |
| Passes | | 3 | **15.33** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **570,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 11,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **22,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **4,775,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 2 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 10.15 | 15.71 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | | 4,500 | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | | 6,000 | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | | 80% | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 1,700 | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 59 | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | | 30 | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | | 0.16 | 21,240 | |
| **Construction Cost (CSOTF)** | **$** | **16,382,000** | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 10.15 | 15.71 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 22 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.0 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,821,000** | **$ 30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 15.71 | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 32,000 | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | | 1,600 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **132,000** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 10.15 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **882,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 10.15 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 51 | 24 | |
| Passes | | 3 | **15.58** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **549,000** | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | | 9,000 | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **18,000** | | |
| | | **TOTAL CAPITAL COST** | **$** | **20,916,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 2 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 10.15 | | 15.71 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 120 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 16 | | **OK** | Input by Engineer |
| Width (Ft) | | 9 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,796,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 11.17 | | 17.28 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 23 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,908,000** | **$** | **31,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.71 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 10.15 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **882,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 11.17 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 53 | | 25 | Input by Engineer |
| Passes | | 3 | | **15.33** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 570,000 | $ | 440,000 | |
| **Construction Cost (Disinfection)** | **$** | **1,010,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 26,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **52,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,802,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 2 | |
| Peak Volume | 25,563 | CF |
| | 0.19 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 15.71 | CFS |
| | 10.15 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **2 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 10.15 | | 15.71 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **882,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 10.15 | | 15.71 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 22 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.0 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,821,000** | **$** | **30,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 15.71 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,100 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 160 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **22,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 10.15 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 51 | | 24 | |
| Passes | | 3 | | **15.58** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 549,000 | $ | 421,000 | |
| **Construction Cost (Disinfection)** | **$** | **970,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,873,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 4 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 79 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **11,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,412 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **69,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **11,958,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.12 | | 16,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.14 | | 19,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 45 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 30 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.15 | | 20,250 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **93,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 8.01 | | 12.40 | = Peak Rate |
| Force Main Diameter (In) | 19 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,600,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 12.40 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 29,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 150 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **21,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 8.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **783,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,668,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 4 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.12 | | 16,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.14 | | 19,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 45 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 30 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.15 | | 20,250 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,282,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.12 | | 0.18 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 8.5 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **386,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 12.40 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 29,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,450 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **122,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 8.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **783,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,730,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | |
| 4 Overflows / Year | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.01 | 12.40 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | | 100% | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.82 | 13.64 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 20 | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.3 | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,689,000** | **$ 28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | | 12.40 | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | Input by Engineer |
| Depth (Ft) | | 20 | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | | 3 | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 8.01 | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **783,000** | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 8.82 | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | 23 | |
| Passes | | 3 | **15.85** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **522,000** | | |
| **7. Regulator / Vortex Drop Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Swirl / Vortex (SF) | | 8,000 | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **16,000** | | |
| | | | **TOTAL CAPITAL COST** | **$ 4,400,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 4 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 8.01 | | 12.40 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 1,400 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 54 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 27 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.13 | | 17,496 | |
| **Construction Cost (CSOTF) $** | **16,384,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 8.01 | | 12.40 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 19 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,600,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 12.40 | | | Ref: CSO Statistics |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 26,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,300 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **112,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 8.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **783,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 8.01 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 45 | | 22 | |
| Passes | 3 | | **15.97** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **506,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 8,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **16,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **20,530,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 4 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 8.01 | | 12.40 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 100 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 15 | | **OK** | Input by Engineer |
| Width (Ft) | | 8 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,458,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 8.82 | | 13.64 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 20 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,689,000** | **$** | **28,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 12.40 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 3,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 150 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **21,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 8.01 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **783,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 8.82 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 47 | | 23 | Input by Engineer |
| Passes | | 3 | | **15.85** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 522,000 | $ | 392,000 | |
| **Construction Cost (Disinfection)** | **$** | **914,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **7,045,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 4 | |
| Peak Volume | 15,955 | CF |
| | 0.12 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 12.40 | CFS |
| | 8.01 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| **SCREENING AND DISINFECTION** | | | | | |
| **4 Overflows / Year** | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 8.01 | | 12.40 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **783,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 8.01 | | 12.40 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 19 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.3 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,600,000** | **$** | **27,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 12.40 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,500 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 130 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **19,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 8.01 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 45 | | 22 | |
| Passes | | 3 | | **15.97** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 506,000 | $ | 374,000 | |
| **Construction Cost (Disinfection)** | **$** | **880,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,457,000** | | | |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEWER SEPARATION | | | | |
| 6 Overflows / Year | | | | |
| **1. Sewer Separation Parameters** | | | | |
| Drainage Area - Suburban Areas (Acres) | | 79 | | **Typ 0, Rev as Req'd** |
| % Separation - Suburban Areas | | 100% | | Complete Separation |
| Drainage Area - Urban Areas (Acres) | | 0 | | Ref: CSO Statistics, Input by Engineer |
| % Separation - Urban Areas | | 100% | | Complete Separation |
| **Construction Cost (Sewer Separation)** | **$** | **11,850,000** | | |
| **2. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | **Modify Regulator** | Reg Mod Only |
| Number Regulators | | 1 | | **Typ 1 Reg, Rev as Req'd** |
| **Construction Cost (Regulators)** | **$** | **39,000** | | |
| **3. Land Acquisition Parameters** | | | | |
| Land Acquisition - Sewer Separation (SF) | | 34,412 | | 1% Drainage Area |
| Land Required Cost ($ / SF) | $ | 2 | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **69,000** | | |
| | | | **TOTAL CAPITAL COST** | **$** **11,958,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 1 | | Surface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.11 | | 14,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.13 | | 16,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parmtrs, Rev as Req'd** |
| Length (Ft) | 41 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 28 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.13 | | 17,220 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **83,000** | | | |
| **2. Influent Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Influent Pumping Rate (MGD / CFS) | 6.33 | | 9.80 | = Peak Rate |
| Force Main Diameter (In) | 17 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,391,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 9.80 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 24,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 120 | | | = ACH x Volume / 60 * 10% |
| **Construction Cost (Odor Control) $** | **17,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | Typ 1, Rev as Req'd |
| Peak Flow, into facility (MGD) | 6.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **706,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **3,366,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SUB-SURFACE STORAGE TANK | | | | |
| 6 Overflows / Year | | | | |
| **1. Tank Parameters** | | | | |
| Storage Type (1=Surface; 2=Subsurface) | 2 | | Subsurface Tank | Default Value |
| Sizing Basis: Peak Volume (MG / CF) | 0.11 | | 14,000 | Ref: CSO Statistics |
| Available Capacity (% Tank Vol) | 85% | | | Ref: Technical Parameters |
| Required Storage Volume (MG / CF) | 0.13 | | 16,000 | = Peak Vol / Available Capacity |
| Side-water Depth (Ft), 15' max depth | 15 | | **Sufficient Depth** | **Ref: Tech Parameters, Rev as Req'd** |
| Length (Ft) | 41 | | | = (Vol / SWD * 1.5)$^{1/2}$ |
| Width (Ft) | 28 | | | = (Vol / SWD / 1.5)$^{1/2}$ |
| Total Volume (MG / CF) | 0.13 | | 17,220 | **Sufficient Volume** |
| Tank Area (SF) | 1,000 | | | = Length x Width |
| **Construction Cost (Storage Tank)** | **1,246,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 0.11 | | 0.17 | = Peak Vol / DW Time x %Req Pump |
| Force Main Diameter (In) | 2 | | | Input by Engineer |
| Force Main Velocity (FPS) | 7.6 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **376,000** | **$** | **13,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 9.80 | | | Ref: Technical Parameters |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 24,000 | | | =Required Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,200 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **106,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 6.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **706,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 2 | | | **Typ 2, Rev as Req'd** |
| Peak Flow (MGD) | 0.00 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | | | |
| Passes | | | **No Disnfctn** | Ref: Tech Param-15 min minimum |
| Construction Cost (Disinfection / CC Tank) $ | - | $ | - | |
| **Construction Cost (Disinfection) $** | **-** | | | **No Disinfection** |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - Tank (SF) | 21,000 | | | =(0.291 x Vol (MG) + 0.439) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **42,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **2,591,000** |

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Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SWIRL CONCENTRATOR / VORTEX SEPARATOR | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Swirl Concentrator / Vortex Separator Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 6.33 | | 9.80 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 10,000 | | 0.01 | Ref: Technical Parameters |
| Diameter (Ft), 35-ft max | | | | **Diameter OK** | Input by Engineer |
| Number of Units Required @ Given Loading Rate | | 0 | | | |
| **Construction Cost (Swirl / Vortex)** | **$** | **-** | | | **Not Applicable - Insufficient Volume** |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Rev as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.97 | | 10.78 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 18 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,473,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 9.80 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 0 | | | = Required Storage Vol x 2, 15' SWD |
| Odor Control Flow Rate (CFM) | | 0 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **-** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | | 6.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **706,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | | 6.97 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 42 | | 20 | |
| Passes | | 3 | | **15.59** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| **Construction Cost (Disinfection)** | **$** | **484,000** | | | |
| **7. Regulator / Vortex Drop Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| New Vortex Drop Shaft | | 1 | | | **Typ=# Regs, Rev Qty as Req'd** |
| **Construction Cost (Regulators/Vortex)** | **$** | **299,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - Swirl / Vortex (SF) | | 7,000 | | | = (0.0154 x Swirl Cap(CFS)) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **14,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **4,065,000** |

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | |
|---|---|---|---|---|
| SEDIMENTATION BASIN (CSOTF) | | | | |
| 6 Overflows / Year | | | | |
| **1. Sedimentation Basin (CSOTF) Parameters** | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | 6.33 | | 9.80 | Ref: CSO Statistics |
| Avg Loading Rate (GPD / SF) / (MGD / SF) | 4,500 | | 0.005 | Ref: Technical Parameters |
| Max Loading Rate (GPD / SF) / (MGD / SF) | 6,000 | | 0.006 | Ref: Technical Parameters |
| Available Capacity (% Basin Vol) | 80% | | | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | 1,100 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | 48 | | **OK** | =(Surf Area x 2)$^{1/2}$ |
| Width (Ft) | 24 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | 12 | | | **Typ 12, Rev as Req'd** |
| Storage Volume @ Selected Dimensions (MG / CF) | 0.10 | | 13,824 | |
| **Construction Cost (CSOTF) $** | **16,387,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | |
| Volume Requiring Pumping (%) | 100% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | 6.33 | | 9.80 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | 17 | | | DW Pump Rate / 2 FPS |
| Force Main Velocity (FPS) | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main) $** | **2,391,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | |
| Peak Flow (CFS) | 9.80 | | | Ref: CSO Statistics |
| Diameter (In) | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | 100 | | | Input by Engineer |
| Depth (Ft) | 20 | | | Input by Engineer |
| **Construction Cost (Pipe) $** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | |
| Air Changes / Hour (ACH) | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | 21,000 | | | =Storage Vol x 1.5 |
| Odor Control Flow Rate (CFM) | 1,050 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control) $** | **95,000** | | | |
| **5. Screening Parameters** | | | | |
| Screening Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow, into facility (MGD) | 6.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening) $** | **706,000** | | | |
| **6. Disinfection Parameters** | | | | |
| Disinfection Required (Yes = 1; No = 2) | 1 | | | **Typ 1, Rev as Req'd** |
| Peak Flow (MGD) | 6.33 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | 40 | | 19 | |
| Passes | 3 | | **15.51** | Ref: Tech Param-15 min minimum |
| | | | **OK Detn Time** | |
| **Construction Cost (Disinfection) $** | **471,000** | | | |
| **7. Regulator Parameters** | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | 1 | | | Input by Engineer |
| **Construction Cost (Regulators) $** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | |
| Land Required - CSOTF (SF) | 8,000 | | | = (0.006 x Cap(CFS) + 0.1137) x 43560 |
| Land Required Cost ($ / SF) $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost $** | **16,000** | | | |
| **TOTAL CAPITAL COST $** | | | | **20,193,000** |

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| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| HIGH RATE END OF PIPE TREATMENT (HREOP) | | | | | |
| 6 Overflows / Year | | | | | |
| **1. High Rate End of Pipe Treatment (HREOP) Parameters** | | | | | |
| Sizing Basis: Peak Flow (MGD / CFS) | | 6.33 | | 9.80 | Ref: CSO Statistics |
| Loading Rate (GPD / SF) / (MGD / SF) | | 85,000 | | 0.085 | Ref: Technical Parameters |
| Surface Area Req'd at Peak Flow (SF) | | 80 | | | = (MGD x 1,000,000) / (6,000 GPD / SF) |
| Length (Ft) | | 14 | | **OK** | Input by Engineer |
| Width (Ft) | | 7 | | **Area OK** | = Area Req'd / Length |
| Max Length : Width Ratio | | 3:1 | | **Ratio OK** | Ref: Technical Parameters |
| Side-water Depth (Ft), 12-ft max depth | | 12 | | | Input by Engineer |
| **Construction Cost (HREOP)** | **$** | **2,193,000** | | | |
| **2. Dewatering Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Underflow Rate (%) | | 10% | | | Ref: Technical Parameters |
| Dewatering Time (Days) | | 1 | | | **Typ 1, Adjust as Req'd Ref: Tech Par** |
| Dewatering Pumping Rate (MGD / CFS) | | 6.97 | | 10.78 | = Peak Vol / DW Time x % Req Pump |
| Force Main Diameter (In) | | 18 | | | Input by Engineer |
| Force Main Velocity (FPS) | | 6.1 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,473,000** | **$** | **26,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 9.80 | | | Ref: Technical Parameters |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =Required Storage Vol x 2 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow, into facility (MGD) | | 6.33 | | | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **706,000** | | | |
| **6. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Input by Engineer |
| Peak Flow (MGD) | | 6.97 | | | Ref: Peak flow of PS |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 42 | | 20 | Input by Engineer |
| Passes | | 3 | | **15.59** | Input by Engineer / 12' SWD Basis |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 484,000 | $ | 344,000 | |
| **Construction Cost (Disinfection)** | **$** | **828,000** | | | |
| **7. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **8. Land Acquisition Parameters** | | | | | |
| Land Required - HREOP (SF) | | 25,000 | | | = (0.0069 x Cap(CFS) + 0.4993) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **50,000** | | | |
| | | | **TOTAL CAPITAL COST** | **$** | **6,393,000** |

Capital Costs

| RESULTS SUMMARY | | |
|---|---|---|
| Number of Events / Year | 51 | |
| Number of Overflows / Year | 6 | |
| Peak Volume | 14,389 | CF |
| | 0.11 | MG |
| Total Volume | 467,924 | CF |
| | 3.50 | MG |
| Peak Rate | 9.80 | CFS |
| | 6.33 | MGD |

| Capital Costs - 005F001 / Sewershed ACSO 005F001 | | | | | |
|---|---|---|---|---|---|
| SCREENING AND DISINFECTION | | | | | |
| 6 Overflows / Year | | | | | |
| **1. Screening Parameters** | | | | | |
| Screening Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow, into facility (MGD) | | 6.33 | | 9.80 | Ref: CSO Statistics |
| **Construction Cost (Screening)** | **$** | **706,000** | | | |
| **2. Pump Station / Force Main Parameters** | | | | | |
| Volume Requiring Pumping (%) | | 100% | | | Ref: Technical Parameters |
| Dewatering Pumping Rate (MGD / CFS) | | 6.33 | | 9.80 | = Peak Flow x % Req Pump |
| Force Main Diameter (In) | | 17 | | | DW Pump Rate / 2FPS |
| Force Main Velocity (FPS) | | 6.2 | | **Check:** | **OK - Velocity >2 fps/< 10 fps** |
| Force Main Length (Ft) | | 100 | | | Input by Engineer |
| **Construction Cost (PS / Force Main)** | **$** | **2,391,000** | **$** | **25,000** | |
| **3. Consolidation and/or Outfall Pipe Parameters** | | | | | |
| Peak Flow (CFS) | | 9.80 | | | Ref: CSO Statistics |
| Diameter (In) | | 36 | | | <25cfs=36"; 25-50cfs=48"; 50-100cfs=66"; 100-150cfs=78"; 150-200cfs=90", 200-250cfs=96"; 250-300cfs=108"; >300cfs=120" |
| Length (Ft) | | 100 | | | Input by Engineer |
| Depth (Ft) | | 20 | | | Input by Engineer |
| **Construction Cost (Pipe)** | **$** | **63,000** | | | |
| **4. Odor Control Parameters** | | | | | |
| Air Changes / Hour (ACH) | | 3 | | | Ref: Technical Parameters |
| Volume of Ventilated Space (CF) | | 2,000 | | | =CFS x 200 |
| Odor Control Flow Rate (CFM) | | 100 | | | = ACH x Volume / 60 |
| **Construction Cost (Odor Control)** | **$** | **15,000** | | | |
| **5. Disinfection Parameters** | | | | | |
| Disinfection Required (Yes = 1; No = 2) | | 1 | | | Default Value |
| Peak Flow (MGD) | | 6.33 | | | Ref: Peak Flow into Facility |
| $Cl_2$ Contact Tank Length / Width (Ft) | | 40 | | 19 | |
| Passes | | 3 | | **15.51** | Ref: Tech Param-15 min minimum |
| | | | | **OK Detn Time** | |
| Construction Cost (Disinfection / CC Tank) | $ | 471,000 | $ | 328,000 | |
| **Construction Cost (Disinfection)** | **$** | **799,000** | | | |
| **6. Regulator Parameters** | | | | | |
| Regulator Construction (0=None; 1=New Static; 2=New Auto; 3=New Reg; 4=Mod Reg) | | 4 | | **Modify Regulator** | Input by Engineer |
| Number Regulators | | 1 | | | Input by Engineer |
| **Construction Cost (Regulators)** | **$** | **39,000** | | | |
| **7. Land Acquisition Parameters** | | | | | |
| Land Required - Screening & Disinfection (SF) | | 23,000 | | | =(0.0016 x Cap(CFS) + 0.514) x 43560 |
| Land Required Cost ($ / SF) | $ | 2 | | | Ref: Technical Parameters |
| **Land Acquisition Cost** | **$** | **46,000** | | | |
| **TOTAL CAPITAL COST** | **$** | **4,084,000** | | | |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 21.99 | $148,198 | 20 | 10.910 | $1,616,829 |
| | Tank O&M | No. Events / Yr | 51 | $34,429 | 50 | 14.484 | $498,661 |
| | | Const Cost ($) | $1,238,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 22 | $9,347 | 20 | 10.910 | $101,972 |
| | Odor Control O&M | Capacity (cfm) | 1,520 | $5,320 | 20 | 10.910 | $58,041 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,918 |
| | | | **Total Annual O&M** | **$198,000** | | **Total PW O&M** | **$2,297,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 1.28 | $22,213 | 20 | 10.910 | $242,346 |
| | Tank O&M | No. Events / Yr | 51 | $43,504 | 50 | 14.484 | $630,100 |
| | | Const Cost ($) | $4,868,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 22 | $9,347 | 20 | 10.910 | $101,972 |
| | Odor Control O&M | Capacity (cfm) | 15,150 | $53,025 | 20 | 10.910 | $578,500 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,598 |
| | | | **Total Annual O&M** | **$129,000** | | **Total PW O&M** | **$1,565,000** |

**Treatment Technologies: Annual O&M Cost Calculations (0 Overflows / Year)**

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 21.99 | $148,198 | 20 | 10.910 | $1,616,829 |
| | Sed. Basin O&M | Flow Rate (mgd) | 21.99 | $2,474 | 50 | 14.484 | $35,832 |
| | Screening O&M | Flow Rate (mgd) | 21.99 | $9,347 | 20 | 10.910 | $101,972 |
| | Disinfection O&M | Flow Rate (mgd) | 21.99 | $105,677 | 20 | 10.910 | $1,152,931 |
| | Odor Control O&M | Capacity (cfm) | 3,450.00 | $12,075 | 20 | 10.910 | $131,738 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $24,363 |
| | | | **Total Annual O&M** | **$278,000** | | **Total PW O&M** | **$3,064,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 24.19 | $157,941 | 20 | 10.910 | $1,723,132 |
| | HREP O&M | Flow Rate (mgd) | 21.99 | $143,410 | 20 | 10.910 | $1,564,598 |
| | Screening O&M | Flow Rate (mgd) | 21.99 | $9,347 | 20 | 10.910 | $101,972 |
| | Disinfection O&M | Flow Rate (mgd) | 24.19 | $111,995 | 20 | 10.910 | $1,221,855 |
| | Odor Control O&M | Capacity (cfm) | 350.00 | $1,225 | 20 | 10.910 | $13,365 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $37,755 |
| | | | **Total Annual O&M** | **$424,000** | | **Total PW O&M** | **$4,663,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 24.19 | $157,941 | 20 | 10.910 | $1,723,132 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 21.99 | $2,474 | 20 | 10.910 | $26,991 |
| | Screening O&M | Flow Rate (mgd) | 21.99 | $9,347 | 20 | 10.910 | $101,972 |
| | Disinfection O&M | Flow Rate (mgd) | 24.19 | $111,995 | 20 | 10.910 | $1,221,855 |
| | Odor Control O&M | Capacity (cfm) | 4,350.00 | $15,225 | 20 | 10.910 | $166,104 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $28,419 |
| | | | **Total Annual O&M** | **$297,000** | | **Total PW O&M** | **$3,268,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 21.99 | $148,198 | 20 | 10.910 | $1,616,829 |
| | Screening O&M | Flow Rate (mgd) | 21.99 | $9,347 | 20 | 10.910 | $101,972 |
| | Disinfection O&M | Flow Rate (mgd) | 21.99 | $105,677 | 20 | 10.910 | $1,152,931 |
| | Odor Control O&M | Capacity (cfm) | 340.00 | $1,190 | 20 | 10.910 | $12,983 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,811 |
| | | | **Total Annual O&M** | **$265,000** | | **Total PW O&M** | **$2,909,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 12.58 | $102,066 | 20 | 10.910 | $1,113,532 |
| | Tank O&M | No. Events / Yr | 51 | $32,189 | 50 | 14.484 | $466,218 |
| | | Const Cost ($) | $342,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 13 | $8,508 | 20 | 10.910 | $92,817 |
| | Odor Control O&M | Capacity (cfm) | 470 | $1,645 | 20 | 10.910 | $17,947 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,848 |
| | | | **Total Annual O&M** | **$145,000** | | **Total PW O&M** | **$1,706,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.39 | $10,087 | 20 | 10.910 | $110,048 |
| | Tank O&M | No. Events / Yr | 51 | $36,652 | 50 | 14.484 | $530,851 |
| | | Const Cost ($) | $2,127,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 13 | $8,508 | 20 | 10.910 | $92,817 |
| | Odor Control O&M | Capacity (cfm) | 4,650 | $16,275 | 20 | 10.910 | $177,559 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $6,062 |
| | | | **Total Annual O&M** | **$72,000** | | **Total PW O&M** | **$917,000** |

**Treatment Technologies: Annual O&M Cost Calculations (1 Overflow / Year)**

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 12.58 | $102,066 | 20 | 10.910 | $1,113,532 |
| | Sed. Basin O&M | Flow Rate (mgd) | 12.58 | $1,416 | 50 | 14.484 | $20,505 |
| | Screening O&M | Flow Rate (mgd) | 12.58 | $8,508 | 20 | 10.910 | $92,817 |
| | Disinfection O&M | Flow Rate (mgd) | 12.58 | $75,214 | 20 | 10.910 | $820,580 |
| | Odor Control O&M | Capacity (cfm) | 1,950.00 | $6,825 | 20 | 10.910 | $74,460 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,758 |
| | | | **Total Annual O&M** | **$195,000** | | **Total PW O&M** | **$2,140,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 13.84 | $108,776 | 20 | 10.910 | $1,186,745 |
| | HREP O&M | Flow Rate (mgd) | 12.58 | $103,279 | 20 | 10.910 | $1,126,770 |
| | Screening O&M | Flow Rate (mgd) | 12.58 | $8,508 | 20 | 10.910 | $92,817 |
| | Disinfection O&M | Flow Rate (mgd) | 13.84 | $79,710 | 20 | 10.910 | $869,635 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $26,751 |
| | | | **Total Annual O&M** | **$301,000** | | **Total PW O&M** | **$3,310,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 13.84 | $108,776 | 20 | 10.910 | $1,186,745 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 12.58 | $1,416 | 20 | 10.910 | $15,445 |
| | Screening O&M | Flow Rate (mgd) | 12.58 | $8,508 | 20 | 10.910 | $92,817 |
| | Disinfection O&M | Flow Rate (mgd) | 13.84 | $79,710 | 20 | 10.910 | $869,635 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $18,031 |
| | | | **Total Annual O&M** | **$199,000** | | **Total PW O&M** | **$2,183,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 12.58 | $102,066 | 20 | 10.910 | $1,113,532 |
| | Screening O&M | Flow Rate (mgd) | 12.58 | $8,508 | 20 | 10.910 | $92,817 |
| | Disinfection O&M | Flow Rate (mgd) | 12.58 | $75,214 | 20 | 10.910 | $820,580 |
| | Odor Control O&M | Capacity (cfm) | 200.00 | $700 | 20 | 10.910 | $7,637 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $17,409 |
| | | | **Total Annual O&M** | **$187,000** | | **Total PW O&M** | **$2,052,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 10.15 | $88,434 | 20 | 10.910 | $964,805 |
| | Tank O&M | No. Events / Yr | 51 | $31,722 | 50 | 14.484 | $459,447 |
| | | Const Cost ($) | $155,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,296 | 20 | 10.910 | $90,509 |
| | Odor Control O&M | Capacity (cfm) | 240 | $840 | 20 | 10.910 | $9,164 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,990 |
| | | | **Total Annual O&M** | **$130,000** | | **Total PW O&M** | **$1,538,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.19 | $6,224 | 20 | 10.910 | $67,904 |
| | Tank O&M | No. Events / Yr | 51 | $35,092 | 50 | 14.484 | $508,257 |
| | | Const Cost ($) | $1,503,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 10 | $8,296 | 20 | 10.910 | $90,509 |
| | Odor Control O&M | Capacity (cfm) | 2,350 | $8,225 | 20 | 10.910 | $89,734 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,710 |
| | | | **Total Annual O&M** | **$58,000** | | **Total PW O&M** | **$761,000** |

**Treatment Technologies: Annual O&M Cost Calculations (2 Overflows / Year)**

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 10.15 | $88,434 | 20 | 10.910 | $964,805 |
| | Sed. Basin O&M | Flow Rate (mgd) | 10.15 | $1,142 | 50 | 14.484 | $16,545 |
| | Screening O&M | Flow Rate (mgd) | 10.15 | $8,296 | 20 | 10.910 | $90,509 |
| | Disinfection O&M | Flow Rate (mgd) | 10.15 | $65,997 | 20 | 10.910 | $720,024 |
| | Odor Control O&M | Capacity (cfm) | 1,600.00 | $5,600 | 20 | 10.910 | $61,096 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,761 |
| | | | **Total Annual O&M** | **$170,000** | | **Total PW O&M** | **$1,869,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 11.17 | $94,248 | 20 | 10.910 | $1,028,239 |
| | HREP O&M | Flow Rate (mgd) | 10.15 | $91,034 | 20 | 10.910 | $993,179 |
| | Screening O&M | Flow Rate (mgd) | 10.15 | $8,296 | 20 | 10.910 | $90,509 |
| | Disinfection O&M | Flow Rate (mgd) | 11.17 | $69,942 | 20 | 10.910 | $763,068 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $23,476 |
| | | | **Total Annual O&M** | **$265,000** | | **Total PW O&M** | **$2,904,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 11.17 | $94,248 | 20 | 10.910 | $1,028,239 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 10.15 | $1,142 | 20 | 10.910 | $12,462 |
| | Screening O&M | Flow Rate (mgd) | 10.15 | $8,296 | 20 | 10.910 | $90,509 |
| | Disinfection O&M | Flow Rate (mgd) | 11.17 | $69,942 | 20 | 10.910 | $763,068 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,814 |
| | | | **Total Annual O&M** | **$174,000** | | **Total PW O&M** | **$1,910,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 10.15 | $88,434 | 20 | 10.910 | $964,805 |
| | Screening O&M | Flow Rate (mgd) | 10.15 | $8,296 | 20 | 10.910 | $90,509 |
| | Disinfection O&M | Flow Rate (mgd) | 10.15 | $65,997 | 20 | 10.910 | $720,024 |
| | Odor Control O&M | Capacity (cfm) | 160.00 | $560 | 20 | 10.910 | $6,110 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $15,462 |
| | | | **Total Annual O&M** | **$164,000** | | **Total PW O&M** | **$1,797,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 8.01 | $75,500 | 20 | 10.910 | $823,703 |
| | Tank O&M | No. Events / Yr | 51 | $31,567 | 50 | 14.484 | $457,202 |
| | | Const Cost ($) | $93,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 8 | $8,112 | 20 | 10.910 | $88,496 |
| | Odor Control O&M | Capacity (cfm) | 150 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,795 |
| | | | **Total Annual O&M** | **$116,000** | | **Total PW O&M** | **$1,388,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.12 | $4,543 | 20 | 10.910 | $49,559 |
| | Tank O&M | No. Events / Yr | 51 | $34,539 | 50 | 14.484 | $500,255 |
| | | Const Cost ($) | $1,282,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 8 | $8,112 | 20 | 10.910 | $88,496 |
| | Odor Control O&M | Capacity (cfm) | 1,450 | $5,075 | 20 | 10.910 | $55,368 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $4,036 |
| | | | **Total Annual O&M** | **$53,000** | | **Total PW O&M** | **$698,000** |

**Treatment Technologies: Annual O&M Cost Calculations (4 Overflows / Year)**

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 8.01 | $75,500 | 20 | 10.910 | $823,703 |
| | Sed. Basin O&M | Flow Rate (mgd) | 8.01 | $902 | 50 | 14.484 | $13,058 |
| | Screening O&M | Flow Rate (mgd) | 8.01 | $8,112 | 20 | 10.910 | $88,496 |
| | Disinfection O&M | Flow Rate (mgd) | 8.01 | $57,136 | 20 | 10.910 | $623,350 |
| | Odor Control O&M | Capacity (cfm) | 1,300.00 | $4,550 | 20 | 10.910 | $49,640 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,419 |
| | | | **Total Annual O&M** | **$147,000** | | **Total PW O&M** | **$1,613,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 8.82 | $80,464 | 20 | 10.910 | $877,860 |
| | HREP O&M | Flow Rate (mgd) | 8.01 | $79,206 | 20 | 10.910 | $864,134 |
| | Screening O&M | Flow Rate (mgd) | 8.01 | $8,112 | 20 | 10.910 | $88,496 |
| | Disinfection O&M | Flow Rate (mgd) | 8.82 | $60,552 | 20 | 10.910 | $660,615 |
| | Odor Control O&M | Capacity (cfm) | 150.00 | $525 | 20 | 10.910 | $5,728 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $21,264 |
| | | | **Total Annual O&M** | **$229,000** | | **Total PW O&M** | **$2,518,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 8.82 | $80,464 | 20 | 10.910 | $877,860 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 8.01 | $902 | 20 | 10.910 | $9,836 |
| | Screening O&M | Flow Rate (mgd) | 8.01 | $8,112 | 20 | 10.910 | $88,496 |
| | Disinfection O&M | Flow Rate (mgd) | 8.82 | $60,552 | 20 | 10.910 | $660,615 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,521 |
| | | | **Total Annual O&M** | **$151,000** | | **Total PW O&M** | **$1,651,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 8.01 | $75,500 | 20 | 10.910 | $823,703 |
| | Screening O&M | Flow Rate (mgd) | 8.01 | $8,112 | 20 | 10.910 | $88,496 |
| | Disinfection O&M | Flow Rate (mgd) | 8.01 | $57,136 | 20 | 10.910 | $623,350 |
| | Odor Control O&M | Capacity (cfm) | 130.00 | $455 | 20 | 10.910 | $4,964 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $14,166 |
| | | | **Total Annual O&M** | **$142,000** | | **Total PW O&M** | **$1,555,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 6.33 | $64,510 | 20 | 10.910 | $703,805 |
| | Tank O&M | No. Events / Yr | 51 | $31,542 | 50 | 14.484 | $456,840 |
| | | Const Cost ($) | $83,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 6 | $7,968 | 20 | 10.910 | $86,928 |
| | Odor Control O&M | Capacity (cfm) | 120 | $420 | 20 | 10.910 | $4,582 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $11,722 |
| | | | **Total Annual O&M** | **$105,000** | | **Total PW O&M** | **$1,264,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Sub-Surface Storage Tank | Pump Station O&M | Flow Rate (mgd) | 0.11 | $4,240 | 20 | 10.910 | $46,254 |
| | Tank O&M | No. Events / Yr | 51 | $34,449 | 50 | 14.484 | $498,951 |
| | | Const Cost ($) | $1,246,000 | | | | |
| | | Man-hours / Crew | 8 | | | | |
| | Screening O&M | Flow Rate (mgd) | 6 | $7,968 | 20 | 10.910 | $86,928 |
| | Odor Control O&M | Capacity (cfm) | 1,200 | $4,200 | 20 | 10.910 | $45,822 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $3,743 |
| | | | **Total Annual O&M** | **$51,000** | | **Total PW O&M** | **$682,000** |

**Treatment Technologies: Annual O&M Cost Calculations (6 Overflows / Year)**

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| CSOTF - Detention & Treatment | Pump Station O&M | Flow Rate (mgd) | 6.33 | $64,510 | 20 | 10.910 | $703,805 |
| | Sed. Basin O&M | Flow Rate (mgd) | 6.33 | $712 | 50 | 14.484 | $10,319 |
| | Screening O&M | Flow Rate (mgd) | 6.33 | $7,968 | 20 | 10.910 | $86,928 |
| | Disinfection O&M | Flow Rate (mgd) | 6.33 | $49,501 | 20 | 10.910 | $540,053 |
| | Odor Control O&M | Capacity (cfm) | 1,050.00 | $3,675 | 20 | 10.910 | $40,094 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,215 |
| | | | **Total Annual O&M** | **$127,000** | | **Total PW O&M** | **$1,394,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| High Rate End-of-Pipe (Ballasted Floc) | Pump Station O&M | Flow Rate (mgd) | 6.97 | $68,752 | 20 | 10.910 | $750,078 |
| | HREP O&M | Flow Rate (mgd) | 6.33 | $68,964 | 20 | 10.910 | $752,391 |
| | Screening O&M | Flow Rate (mgd) | 6.33 | $7,968 | 20 | 10.910 | $86,928 |
| | Disinfection O&M | Flow Rate (mgd) | 6.97 | $52,460 | 20 | 10.910 | $572,338 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $19,332 |
| | | | **Total Annual O&M** | **$199,000** | | **Total PW O&M** | **$2,185,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Swirl / Vortex | Pump Station O&M | Flow Rate (mgd) | 6.97 | $68,752 | 20 | 10.910 | $750,078 |
| | Swirl / Vortex O&M | Flow Rate (mgd) | 6.33 | $712 | 20 | 10.910 | $7,773 |
| | Screening O&M | Flow Rate (mgd) | 6.33 | $7,968 | 20 | 10.910 | $86,928 |
| | Disinfection O&M | Flow Rate (mgd) | 6.97 | $52,460 | 20 | 10.910 | $572,338 |
| | Odor Control O&M | Capacity (cfm) | 0.00 | $0 | 20 | 10.910 | $0 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $13,327 |
| | | | **Total Annual O&M** | **$130,000** | | **Total PW O&M** | **$1,430,000** |

| ACSO 005F001 | Requirement | Input Parameter | Input Value | Annual O&M Cost | Service Life (Yr) | Present Worth Factor | Present Worth |
|---|---|---|---|---|---|---|---|
| Screening & Disinfection | Pump Station O&M | Flow Rate (mgd) | 6.33 | $64,510 | 20 | 10.910 | $703,805 |
| | Screening O&M | Flow Rate (mgd) | 6.33 | $7,968 | 20 | 10.910 | $86,928 |
| | Disinfection O&M | Flow Rate (mgd) | 6.33 | $49,501 | 20 | 10.910 | $540,053 |
| | Odor Control O&M | Capacity (cfm) | 100.00 | $350 | 20 | 10.910 | $3,818 |
| | Reserve / Replace | 10% Gravity / 15% Pump | | | | | $12,998 |
| | | | **Total Annual O&M** | **$123,000** | | **Total PW O&M** | **$1,348,000** |

Cost Summary

CS4-Separation SEWER SEPARATION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.0 | $11,958,000 | $0 |
| 1 | $12.0 | $11,958,000 | $0 |
| 2 | $12.0 | $11,958,000 | $0 |
| 4 | $12.0 | $11,958,000 | $0 |
| 6 | $12.0 | $11,958,000 | $0 |

S2-Sub Surf Tnk SUB-SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $10.2 | $8,661,000 | $1,565,000 |
| 1 | $5.1 | $4,212,000 | $917,000 |
| 2 | $3.9 | $3,171,000 | $761,000 |
| 4 | $3.4 | $2,730,000 | $698,000 |
| 6 | $3.3 | $2,591,000 | $682,000 |

S4-Surf Tnk SURFACE STORAGE TANK

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $9.7 | $7,368,000 | $2,297,000 |
| 1 | $6.5 | $4,759,000 | $1,706,000 |
| 2 | $5.6 | $4,064,000 | $1,538,000 |
| 4 | $5.1 | $3,668,000 | $1,388,000 |
| 6 | $4.6 | $3,366,000 | $1,264,000 |

T1-Vortex SWIRL CONCENTRATOR / VORTEX SEPARATOR

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $12.9 | $9,615,000 | $3,268,000 |
| 1 | $7.6 | $5,381,000 | $2,183,000 |
| 2 | $6.7 | $4,775,000 | $1,910,000 |
| 4 | $6.1 | $4,400,000 | $1,651,000 |
| 6 | $5.5 | $4,065,000 | $1,430,000 |

T2-HREOP HIGH RATE END OF PIPE TREATMENT (HREOP)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $17.2 | $12,516,000 | $4,663,000 |
| 1 | $12.2 | $8,857,000 | $3,310,000 |
| 2 | $10.7 | $7,802,000 | $2,904,000 |
| 4 | $9.6 | $7,045,000 | $2,518,000 |
| 6 | $8.6 | $6,393,000 | $2,185,000 |

T3-CSOTF SEDIMENTATION BASIN (CSOTF)

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $26.4 | $23,352,000 | $3,064,000 |
| 1 | $23.6 | $21,468,000 | $2,140,000 |
| 2 | $22.8 | $20,916,000 | $1,869,000 |
| 4 | $22.1 | $20,530,000 | $1,613,000 |
| 6 | $21.6 | $20,193,000 | $1,394,000 |

T4-Scr & Dis SCREENING AND DISINFECTION

| Overflows per year | PW Cost (million) | Capital Cost | PW O&M Cost |
|---|---|---|---|
| 0 | $10.4 | $7,460,000 | $2,909,000 |
| 1 | $7.5 | $5,462,000 | $2,052,000 |
| 2 | $6.7 | $4,873,000 | $1,797,000 |
| 4 | $6.0 | $4,457,000 | $1,555,000 |
| 6 | $5.4 | $4,084,000 | $1,348,000 |

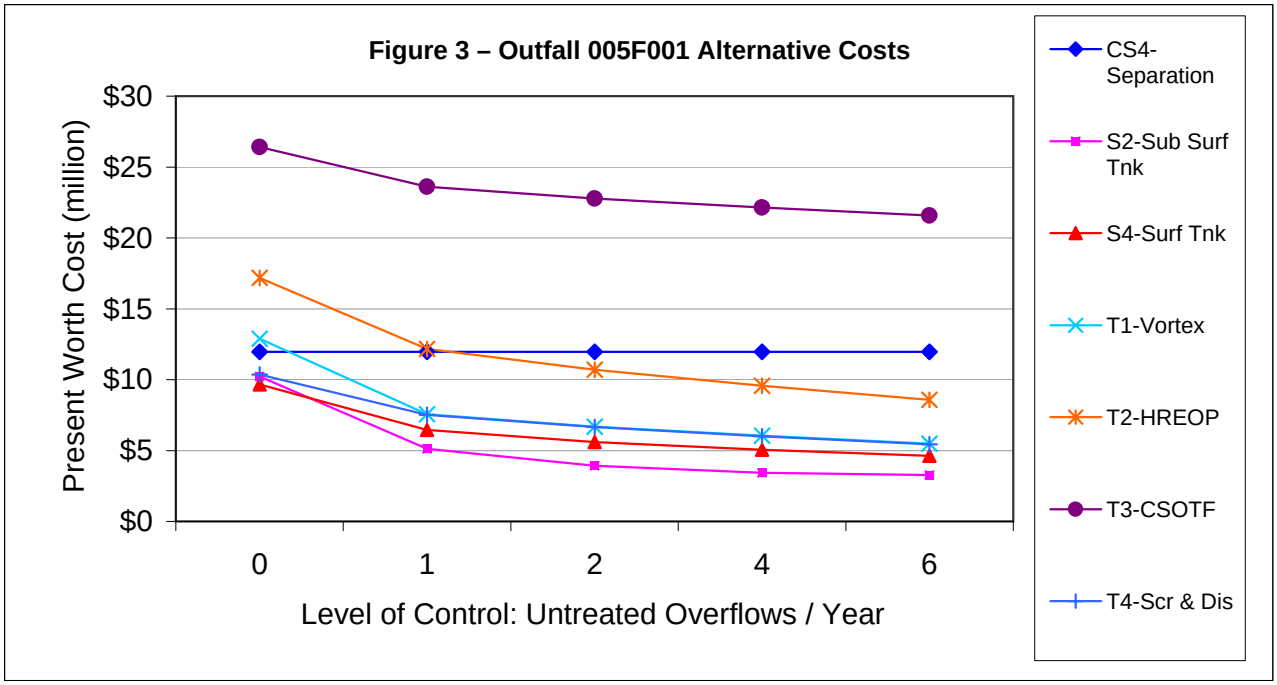


Figure 3 – Outfall 005F001 Alternative Costs
Present Worth Cost (million)
$30
$25
$20
$15
$10
$5
$0
0
1
2
4
6
Level of Control: Untreated Overflows / Year
CS4-Separation
S2-Sub Surf Tnk
S4-Surf Tnk
T1-Vortex
T2-HREOP
T3-CSOTF
T4-Scr & Dis

# Region 1

## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 005F001 |
| **Location Name** | Banksville Road |
| **Model ID** | ADC 005FS40-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005F001 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

**Results Summary**

| | |
|---|---|
| Number of Events: | 51 |
| Peak Volume: | 171,654 $ft^3$ |
| | 1.28 MG |
| Total Volume: | 467,924 $ft^3$ |
| | 3.50 MG |
| Peak Rate: | 34.03 cfs |

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/5/2005 13:32 | 1447 | 1/6/2005 10:15 | 171653.67 | 1284.055 | 0 | 4.54 | 17 |
| 8/20/2005 18:15 | 65 | 8/20/2005 19:00 | 52659.37 | 393.918 | 1 | 34.03 | 0 |
| 5/13/2005 22:30 | 140 | 5/13/2005 22:45 | 25563.21 | 191.226 | 2 | 12.40 | 4 |
| 7/26/2005 19:45 | 35 | 7/26/2005 20:00 | 20036.28 | 149.881 | 3 | 19.47 | 1 |
| 11/14/2005 21:50 | 375 | 11/15/2005 3:45 | 15954.94 | 119.351 | 4 | 4.27 | 18 |
| 11/9/2005 19:15 | 35 | 11/9/2005 19:30 | 14737.11 | 110.241 | 5 | 9.80 | 6 |
| 5/23/2005 16:15 | 35 | 5/23/2005 16:30 | 14389.12 | 107.638 | 6 | 15.71 | 2 |
| 7/21/2005 14:20 | 31 | 7/21/2005 14:45 | 13493.13 | 100.935 | 7 | 12.67 | 3 |
| 6/11/2005 17:30 | 38 | 6/11/2005 17:45 | 12414.01 | 92.863 | 8 | 9.40 | 8 |
| 7/15/2005 17:35 | 49 | 7/15/2005 17:45 | 11747.43 | 87.877 | 9 | 6.34 | 13 |
| 7/5/2005 16:30 | 35 | 7/5/2005 16:45 | 10239.74 | 76.598 | 10 | 10.25 | 5 |
| 11/29/2005 6:45 | 320 | 11/29/2005 7:00 | 10045.93 | 75.149 | 11 | 2.86 | 23 |
| 8/29/2005 9:15 | 275 | 8/29/2005 13:45 | 9217.02 | 68.948 | 12 | 5.72 | 16 |
| 5/11/2005 22:35 | 92 | 5/11/2005 22:45 | 7137.34 | 53.391 | 13 | 5.96 | 14 |
| 4/23/2005 3:40 | 62 | 4/23/2005 4:15 | 6957.25 | 52.044 | 14 | 3.24 | 21 |
| 5/14/2005 16:00 | 64 | 5/14/2005 16:15 | 6875.94 | 51.436 | 15 | 9.58 | 7 |
| 9/29/2005 5:30 | 20 | 9/29/2005 5:45 | 6802.10 | 50.883 | 16 | 8.00 | 11 |
| 11/9/2005 4:15 | 23 | 11/9/2005 4:30 | 6604.00 | 49.401 | 17 | 8.81 | 10 |
| 7/25/2005 13:15 | 20 | 7/25/2005 13:30 | 5305.69 | 39.689 | 18 | 8.82 | 9 |
| 8/27/2005 15:20 | 15 | 8/27/2005 15:30 | 4094.35 | 30.628 | 19 | 7.21 | 12 |
| 1/8/2005 4:45 | 63 | 1/8/2005 5:15 | 3897.79 | 29.157 | 20 | 2.34 | 26 |
| 1/12/2005 0:51 | 46 | 1/12/2005 1:30 | 3386.19 | 25.330 | 21 | 2.29 | 27 |
| 5/28/2005 8:40 | 55 | 5/28/2005 9:00 | 2918.26 | 21.830 | 22 | 1.31 | 33 |
| 2/9/2005 16:30 | 20 | 2/9/2005 16:45 | 2811.03 | 21.028 | 23 | 3.38 | 20 |
| 3/28/2005 9:13 | 598 | 3/28/2005 19:00 | 2720.98 | 20.354 | 24 | 1.49 | 32 |
| 6/28/2005 18:05 | 15 | 6/28/2005 18:15 | 2646.72 | 19.799 | 25 | 5.91 | 15 |
| 7/12/2005 19:45 | 24 | 7/12/2005 20:00 | 2337.96 | 17.489 | 26 | 2.73 | 24 |
| 1/11/2005 8:45 | 171 | 1/11/2005 11:30 | 2164.89 | 16.194 | 27 | 1.51 | 31 |
| 7/17/2005 16:20 | 29 | 7/17/2005 16:30 | 2133.03 | 15.956 | 28 | 2.69 | 25 |
| 4/2/2005 6:02 | 62 | 4/2/2005 6:45 | 1917.21 | 14.342 | 29 | 0.88 | 38 |
| 12/15/2005 13:45 | 20 | 12/15/2005 14:00 | 1815.06 | 13.578 | 30 | 2.26 | 28 |
| 2/20/2005 19:45 | 50 | 2/20/2005 20:00 | 1803.68 | 13.492 | 31 | 1.54 | 30 |
| 11/16/2005 4:05 | 19 | 11/16/2005 4:15 | 1729.16 | 12.935 | 32 | 3.69 | 19 |

Exceedance Summary

| Exceedance Timing | | | Exceedance Volume | | | Peak Flow Rate | |
|---|---|---|---|---|---|---|---|
| Start of Exceedance | Exceedance Duration (minutes) | Time of Peak Flow | ($ft^3$) | (1,000 gallons) | Number of Exceedances | (cfs) | Number of Exceedances |
| 1/14/2005 2:00 | 20 | 1/14/2005 2:15 | 1455.52 | 10.888 | 33 | 1.75 | 29 |
| 8/26/2005 20:50 | 18 | 8/26/2005 21:00 | 1349.34 | 10.094 | 34 | 2.87 | 22 |
| 10/7/2005 10:20 | 44 | 10/7/2005 10:45 | 1256.74 | 9.401 | 35 | 0.96 | 37 |
| 10/21/2005 18:50 | 30 | 10/21/2005 19:00 | 1069.48 | 8.000 | 36 | 0.82 | 39 |
| 10/22/2005 6:45 | 20 | 10/22/2005 7:00 | 986.60 | 7.380 | 37 | 1.25 | 34 |
| 1/3/2005 13:06 | 58 | 1/3/2005 13:45 | 943.45 | 7.057 | 38 | 0.42 | 41 |
| 5/7/2005 13:15 | 19 | 5/7/2005 13:30 | 706.71 | 5.287 | 39 | 1.05 | 36 |
| 10/21/2005 7:20 | 15 | 10/21/2005 7:30 | 601.21 | 4.497 | 40 | 1.08 | 35 |
| 9/23/2005 2:46 | 19 | 9/23/2005 3:00 | 294.50 | 2.203 | 41 | 0.44 | 40 |
| 1/5/2005 4:31 | 138 | 1/5/2005 4:45 | 249.51 | 1.866 | 42 | 0.26 | 46 |
| 4/22/2005 16:01 | 18 | 4/22/2005 16:15 | 200.20 | 1.498 | 43 | 0.29 | 44 |
| 6/3/2005 9:05 | 14 | 6/3/2005 9:15 | 182.89 | 1.368 | 44 | 0.33 | 42 |
| 9/26/2005 9:32 | 17 | 9/26/2005 9:45 | 142.29 | 1.064 | 45 | 0.22 | 47 |
| 3/27/2005 16:55 | 9 | 3/27/2005 17:00 | 88.92 | 0.665 | 46 | 0.30 | 43 |
| 2/16/2005 7:10 | 9 | 2/16/2005 7:15 | 81.36 | 0.609 | 47 | 0.27 | 45 |
| 11/1/2005 16:22 | 11 | 11/1/2005 16:30 | 43.79 | 0.328 | 48 | 0.09 | 49 |
| 3/23/2005 12:35 | 12 | 3/23/2005 12:45 | 31.91 | 0.239 | 49 | 0.05 | 50 |
| 10/22/2005 16:16 | 7 | 10/22/2005 16:20 | 30.02 | 0.225 | 50 | 0.11 | 48 |

# Region 1

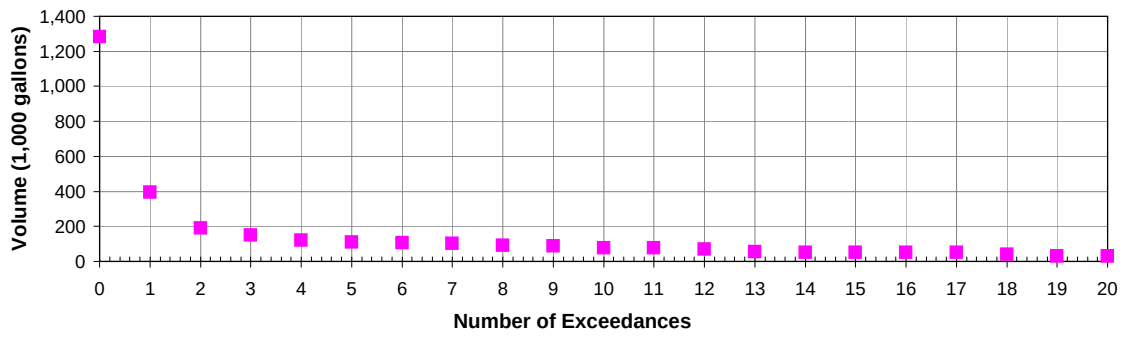
## PWSA CSO DISCHARGES
## for "Typical Year - 2005"
## Base Line Condition

| | |
|---|---|
| **Structure ID** | ACSO 005F001 |
| **Location Name** | Banksville Road |
| **Model ID** | ADC 005FS40-W.2 |
| **Structure Type** | Outfall |
| **PWSA Sewershed** | Olympia, Shaler and Woodruff Streets |
| **Stream of Discharge** | Saw Mill Run |
| **NPDES Permit Number** | 005F001 |
| **Owner** | ALCOSAN |
| **Model Network** | (07/19/07) Baseline Conditions#2 - FINAL!#1_1#2 |
| **Model Run** | 2005 Baseline Conditions w/Boundary (8.8.07) |

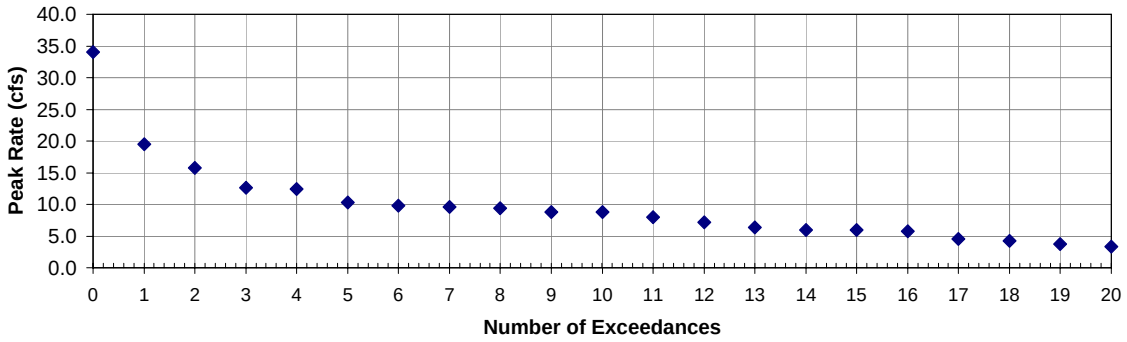
**Results Summary**

| | |
|---|---|
| Number of Events: | 51 |
| Peak Volume: | 171,654 $ft^3$ |
| | 1.28 MG |
| Total Volume: | 467,924 $ft^3$ |
| | 3.50 MG |
| Peak Rate: | 34.03 cfs |

### Figure 1 - Outfall 005F001 CSO Volume




### Figure 2 - Outfall 005F001 CSO Peak Flow Rate



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