City and County of San Francisco
2030 Sewer System Master Plan

TASK 600
TECHNICAL MEMORANDUM NO. 601
PREFERRED SYSTEM CONFIGURATION

FINAL DRAFT
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CITY AND COUNTY OF SAN FRANCISCO
SEWER SYSTEM MASTER PLAN

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EXISTING OUTFALL ANALYSIS

Please note this memo was created in February of 2007 and was not updated. It was determined by the SFPUC and the consultants that it was important to capture the information at the time of development so the reviewers could see the progression of information and decisions made at the time of the memo development. Please also note that the word 'alternative' was used instead of 'configurations' for the memos reflecting the existing wording at the time it was written. In the Summary Report, the term was updated to 'configuration' so as not to confuse the CEQA review process. The configurations mentioned herein may have changed or been eliminated and are not considered full CEQA alternatives.

1.0 INTRODUCTION

The San Francisco Sewer System Master Plan (Master Plan) Team has identified four viable alternatives that achieve the wastewater treatment and stormwater management objectives as set forth by the Master Plan. The four alternatives are: 1) Improve the Existing System, 2) Decentralized Treatment, 3) Treat All Dry-Weather Flows at Oceanside Plant, and 4) Relocate Southeast Plant to New Bayside Site. It is envisioned that the Sewer System Master Plan (i.e., the recommended alternative) will be implemented over 30 years through three (3) sequential 10-Year Capital Improvement Programs (CIP). Projects will be prioritized for implementation into the 10-year phases based on criticality, benefit, and the infrastructures' remaining useful life. Phasing of the Master Plan allows for the systematic upgrades of high priority projects while minimizing financial impacts to the rate payers. The projects in Phases 1 and 2 (Years 0-10 and Years 11-20, respectively) are identical in each of the alternatives. In Phase 3 (Years 21 to 30) four distinct alternatives have been developed that pose possible scenarios for the relocation and/or replacement of the wastewater treatment facilities, including the Southeast Plant. The overarching goal of the phasing of the alternatives is to provide systematic upgrades and improvements to the treatment facilities for the City and County of San Francisco.

This Technical Memorandum outlines the projects included in each CIP, provides capital and operation and maintenance (O&M) costs for the recommended project, and describes the alternatives that achieve wastewater treatment and stormwater management objectives set forth by the Sewer System Master Plan. Facility and collection system project elements included within each alternative are also summarized.

2.0 PROJECTS INCLUDED IN CAPITAL IMPROVEMENT PROGRAMS

2.1 Treatment Facilities

Through the recommended Master Plan project, improvements will be made to the existing treatment facilities to ensure reliability with minimal changes to wastewater distribution, level of treatment, or discharge locations. A summary of the facility improvements to be made in each CIP is provided in Table 1. During the first CIP, improvements will be made to the current liquid treatment processes at the Southeast Plant (SEP). These upgrades include replacing the existing wet-weather pretreatment (Building 011) with new wet-weather headworks with mechanical bar screens and vortex grit chambers. Primary treatment will continue to occur in Buildings 040/041 and 042, and the existing primary basins will be recoated and clarifier mechanisms will be replaced. Secondary treatment at SEP, provided by the existing high-purity oxygen activated sludge and secondary clarifiers, will be refurbished. Secondary effluent will be disinfected through a new ultraviolet (UV) facility and wet-weather primary effluent will be disinfected using the existing chlorine contact channel. Beginning in the first CIP, and continuing through the following phases, landscape and architectural improvements will be implemented at SEP to screen the plant to minimize current visual impacts.

During the second CIP, improvements to the preliminary and primary systems will be replaced, increasing SEP wet-weather treatment capacity to 400 million gallons per day (mgd). At this time, a new deep-water outfall will be constructed for the discharge of all SEP effluent to the Bay. The new outfall will have a capacity of 400 mgd, which will eliminate secondary discharge to Islais Creek.

A new Bayside Biosolids Center (BBC) will be constructed during the first CIP to treat the solids at SEP. BBC will replace the anaerobic digesters and other solid handling facilities currently at SEP. BBC will be located either at the existing SEP, the Islais Creek site (between Evans Avenue and Islais Creek), or at the Pier 94 Backlands. Unthickened solids will be transported from SEP to BBC through pipeline flow. Solids treatment at BBC will include thickening, digestion, dewatering, and digester gas management. Advanced biosolids processing needed for potential future requirements will be implemented during the second CIP.

During the first CIP, the Channel Pump Station will be modified and conveyance structures will be constructed to allow flow to be pumped from the Central Basin to North Point Facility (NPF). This will provide seismic redundancy to the existing 66-inch force main. Additional improvements to NPF will include refurbishment of the primary clarifiers and new chemical facilities. In the second CIP new pretreatment and chlorine disinfection facilities will be implemented, and the capacity of the NPF will be increased to 240 mgd to reduce Bayside near-shore discharges. At this time a new 240-mgd deep-water outfall will be constructed for the discharge of NPF effluent.

During the second CIP, additional flow will be decentralized from SEP by diverting Islais Creek drainage on the Bayside through a tunnel and to OSP for treatment. During wet weather, this tunnel also provides flooding relief by carrying combined flow from the Bayside, through a decant facility for discharge through SWOO when OSP is at full capacity.

The Oceanside Plant (OSP) will continue to treat flow from the Westside, and provide secondary treatment up to 43 mgd and primary treatment up to 65 mgd. As part of the recommended project the preliminary treatment process at OSP will be upgraded during the first CIP to provide additional grit handling capacity during wet-weather grit events. In the event that effluent disinfection is required, a UV facility will be constructed to disinfect secondary effluent in the second CIP. In addition, a thermal hydrolysis facility will be constructed at OSP to provide solids pretreatment. This treatment will achieve a minimum of Class A biosolids quality to assure continued land application or other reuse applications. Treated effluent is discharged through the Southwest Ocean Outfall (SWOO). In the third CIP, improvements to SWOO will allow for discharges up to 300 mgd to reduce Westside near-shore discharges.

It is envisioned that during the third CIP, continued liquid treatment improvements would be to SEP. These upgrades include new primary clarifiers and a new membrane bioreactor (MBR) facility at the existing SEP site. However, the upgrades and improvements made during the first and second CIP of the recommended project afford flexibility during the third CIP, so that any of the original four alternative projects can be implemented. This flexibility is needed due to the uncertainty of future regulatory discharge limits into the Bay, and the uncertainty of when these limits will be implemented. More stringent regulatory requirements may dictate enhanced treatment or eliminate discharge to the Bay. The improvements made during the first and second CIP of the recommended project, will naturally allow for an increased diversion of Bayside flows to the west to reduce discharges into the Bay, or the implementation of additional treatment technologies at OSP and NPF if required.

2.2 Collection System

In addition to the modifications that are going to be made in the collection system to convey flows to the upgraded treatment facilities, discussed in detail above, the Master Plan also includes collection system improvement programs designed to repair and replace aging sewer infrastructure and mitigate flooding issues.

Three separate programs are being developed to address the biggest rehabilitation/ replacement needs – flood control, the rehabilitation of critical buried infrastructure assets, and a comprehensive rehabilitation and replacement program for all other buried infrastructure assets.

Table 1 Treatment Facility Improvements Included in the Recommended Project
2030 Sewer System Master Plan
City and County of San Francisco

CIP	0-10 years out	10-20 years out	20-30 years out
Southeast Plant	Odor Control Improvements Architectural and Landscape Screening Refurbish Influent Pump Station New Headworks Refurbish Primary Clarifiers High Purity Oxygen Upgrades Refurbish Secondary Clarifiers New UV Disinfection (2^o)	Increase Wet-Weather Capacity to 400 mgd	New Primary Clarifiers Odor Control Improvements MBR Facility
New Bayside Biosolids Center (BBC)	Pier 94 or Islais Creek Site New Gravity Belt Thickeners New 6 Digesters New Pasteurization Tanks New Dewatering New Gas Handling New Energy Recovery New Odor & Chemical Systems	Biosolids Drying	
Oceanside Plant	Additional Grit Removal	UV Disinfection New Solids Pretreatment	
North Point Facility	Refurbish Primary Clarifiers New Chemical Facilities	New Pretreatment New Chlorine Disinfection Facilities Increase Wet-Weather Capacity to 240 mgd New PS and Force Mains, NSS to NPF	
Outfalls	SE Bay Outfall Repairs NP Outfall Repairs SWOO Backflow Prevention	New SE Bay Outfall – 400 mgd New NP Outfall – 240 mgd SWOO Backflow Prevention	SWOO Backflow Prevention
Intertie	New PS and Force Main, CHS to NPF Sludge Pipe, SEP to BBC	Cayuga Tunnel	Increase Decant at OSP to 300 mgd

Below is a summary of each of the three major programs:

- The **Flooding Improvement/System Improvement Program** is designed to reduce flooding to the extent practicable by identifying and targeting problem areas, prioritizing flood relief projects, optimizing existing facilities and conditions, and supplementing and modifying existing facilities where needed.

- The **Critical Sewer Rehabilitation and Replacement Program** will address the most critical of the collection system assets such as large diameter sewers (e.g. >60-inch in diameter), brick sewers, large diameter tunnels, transport storage boxes, and force mains. The program will prioritize a rehabilitation and replacement program for assets that if failed would have a significant catastrophic impact on the wastewater conveyance system and the community.

- The **Ongoing Rehabilitation and Replacement Program** is designed to update and refine the annual rehabilitation and replacement program that the City currently undertakes each year. Based on recent assessments, it is apparent that the current rates of repair are not sufficient to maintain an average system age of 100 to 120 years. Maintaining a system of this average age is important to minimize sewer failures and their ancillary consequences such as uncontrolled spills, potholes or street collapse, and private property damage. This program will identify near-term and longer-term activities that need to take place to improve the annual rehabilitation and replacement program.

The foundation of all three programs will be improving asset management tools for condition assessment rating. Data collection, management, and analysis are significant components to all three of these programs. The Master Plan also identifies specific investments needed to strengthen and improve these areas.

In all three programs, impacts of global climate change will be taken into consideration. Options to control the backflow of water into the collection system from sea level rise and the impact of higher intensity rainfall will be taken into consideration when sizing and designing various improvement programs.

2.3 Low Impact Development Program

The use of Low Impact Development (LID) techniques, such as eco roofs, roof disconnection, street trees, bioretention, permeable pavements, and institutional cisterns, can provide economic and environmental benefits throughout the City. These benefits are realized through reductions in the volume of storm water that needs to be pumped and treated, reductions the volume and frequency of CSDs, and the use of reclaimed water in lieu of potable water where applicable. As part of the collection system improvement projects, LID techniques will be reviewed and implemented, where appropriate. First, as part of the Recommended Master Plan Project, demonstration projects with various LID

technologies will be implemented to determine those technologies best suited for the City, and subsequently, basin-scale LID projects will be implemented to reduce stormwater flows to the sewer.

2.4 Reuse Program

As part of the recommended project, a water reuse program will be implemented to minimize the use of potable water and increase beneficial reuse within San Francisco. Although the Reuse Program is considered a part of the Master Plan, it is not included in the Master Plan capital costs, and will be financially supported by other means. Two specific projects, the Flynn Pump Station and the McLaren Park have been identified as water reclamation facility sites with an estimated capacity of 2.0 mgd. The reclamation facility at the Flynn Pump Station would serve the Central Basin and would bring reclaimed water to the industrial area surrounding the facility, while the facility at McLaren Park would serve Hunter's Point and McLaren Park.

2.5 Capital and O&M Costs

The estimated capital costs for the SSMP recommended project are provided in Table 2. Table 3 outlines the estimated annual O&M costs for the recommended project.

3.0 ALTERNATIVES

3.1 Alternative 1: Improve Existing System

The goal of this alternative is to maintain the infrastructure of the existing liquid treatment facilities through Phases 1 and 2. The major improvements of this alternative include a new biosolids treatment facility and visual screening at the Southeast Plant during Phase 1 and an entirely new plant for liquid treatment in Phase 3.

Alternative 1 improvements to current treatment facilities will ensure reliability without altering wastewater distribution, treatment, or discharge locations. Upgrades will be made to the current liquid treatment processes at the SEP. Existing wet-weather pretreatment (Building 011) will be replaced with new wet-weather headworks with mechanical bar screens and vortex grit chambers. Primary treatment will remain at the existing primary clarifiers in Buildings 040/041 and 042. The existing primary basins will be recoated and the clarifier mechanisms will be replaced. Secondary treatment, provided by the existing high-purity oxygen activated sludge and secondary clarifiers, will be refurbished. Secondary effluent will be disinfected through a new UV facility and wet-weather primary effluent will be disinfected using the existing chlorine contact channel. During Phase 1, landscape and architectural improvements will be designed to screen the plant to minimize current visual impacts and the current Southeast Bay Outfall (SBO) will be repaired. In Phase 2, improvements to the preliminary and primary systems will be implemented to allow for increased treatment. Ultimately, all SEP effluent will be discharged to the Bay through a

Table 2 Estimated Capital Costs for the Recommended Project.
(All Costs are in December 2007 Dollars)
2030 Sewer System Master Plan
City and County of San Francisco

	1st CIP 0-10 yrs out ($ Million)	2nd CIP 10-20 yrs out ($ Million)	3rd CIP 20-30 yrs out ($ Million)
TREATMENT FACILITIES			
Southeast Plant	$252.2	$147.9	$431.8
Oceanside Plant	$17.7	$76.2	$0.0
North Point Facility	$39.3	$146.9	$0.0
Bayside Biosolids Center	$737.4	$33.5	$0.0
Outfall Repairs	$5.2	$546.8	$3.0
Channel to North Point	$45.9	$0.0	$0.0
TOTAL FACILITY COSTS	**$1,097.7**	**$951.3**	**$434.8**
COLLECTION SYSTEM			
Critical Collection System	$113.2	$96.7	$96.7
Flood Control	$150.0	$354.5	$124.0
LID Implementation	$20.0	$20.0	$20.0
Back Flow Prevention	$20.0	$0.0	$0.0
Pump Stations and Force Mains	$12.0	$20.0	$28.0
TOTAL COLLECTION SYSTEM COSTS	**$315.2**	**$491.2**	**$268.7**
TOTAL CAPITAL COSTS	**$1,413**	**$1,443**	**$704**

Table 3 Estimated Annual O&M Costs Following the Completion of Recommended Project.
(All Costs are in December 2007 Dollars)
2030 Sewer System Master Plan
City and County of San Francisco

Item	Annual Cost ($ Million)
Power	
Treatment Facility	$11.5
Collection System	$0.6
Chemicals	$5.3
Labor	$27.5
Hauling	$3.1
Collection System (other than power)	$49.8
TOTAL	**$97.8**

new deep-water outfall (Phase 2). The new SBO (NSBO) will have a capacity of 400 mgd to eliminate secondary discharge to Islais Creek. During Phase 3, it is envisioned that an entirely new plant will be built on the existing site for liquid treatment. Solids generated at

SEP will be treated at the new BBC, which will be constructed during Phase 1. BBC will replace the anaerobic digesters and other solid handling facilities currently at SEP. BBC will be located either at the Islais Creek site (between Evans Avenue and Islais Creek) or at the Pier 94 Backlands, or solids treatment will remain at the existing SEP. Unthickened solids will be transported to the BBC through pipeline flow, and treatment at BBC includes thickening, digestion, dewatering, and digester gas management. Space will also be allocated for advanced biosolids processing needed for potential future requirements.

During the first phase, the Channel Pump Station will be modified and conveyance structures will be constructed to allow flow to be pumped from the Central Basin to NPF. This will provide seismic redundancy to the existing 66-inch force main. Additional improvements to NPF include refurbishment of the primary clarifiers and repair of the existing outfall during Phase 1. In Phase 2, the capacity of the NPF will be increased to 240 mgd to reduce Bayside near-shore discharges and the NPF effluent will be discharged through a new 240-mgd deep-water outfall.

The OSP will continue to treat flow from the Westside, and provide secondary treatment up to 43 mgd and primary treatment up to 65 mgd. As part of Alternative 1, the preliminary treatment process at OSP will be upgraded to provide additional grit handling capacity during wet-weather grit events. Treated effluent is discharged through the SWOO. In Phase 2, improvements to SWOO will allow for discharges up to 300 mgd to reduce Westside near-shore discharges. In addition, a thermal hydrolysis facility will be constructed at OSP to provide solids pretreatment. This treatment will achieve a minimum of Class A biosolids quality to assure continued land application or other reuse applications.

3.2 Alternative 2: Decentralized Treatment

Alternative 2 will achieve decentralized treatment and enhanced treatment facility reliability and redundancy by converting NPF to a secondary treatment plant, which will treat dry-weather flows from the North Shore. In addition, Islais Creek drainage on the Bayside will be diverted to OSP for treatment.

Phases 1 and 2 of Alternative 2 will include the same improvements detailed in the first and second phase of Alternative 1. However, in Phase 3 of this alternative, treatment is decentralized from SEP by providing 18 mgd of secondary treatment at NPF for dry-weather flows from the North Shore. New pretreatment, primary treatment, activated sludge, membrane bioreactor (MBR), UV disinfection, and chlorine contact facilities (Seawall Triangle) will be constructed at NPF. New sludge pipes will transport solids generated at NPF to BBC for treatment. NPF will also continue to provide primary treatment and disinfection for wet-weather flows from the North Shore area and from the Channel Transport Box system up to flows of 266 mgd. All treated effluent is discharged through a new increased capacity North Point Outfall (NPO), to be constructed during Phase 2.

During Phase 3 of Alternative 2, additional flow is decentralized from SEP by diverting Islais Creek drainage on the Bayside through a new tunnel that runs from the Cayuga Street area to the Lake Merced Transport. Flow diverted through this tunnel is treated at the existing OSP. During wet weather, this tunnel also carries combined flow from the Cayuga area, through a decant facility for discharge through SWOO when OSP is at full capacity.

Improvements made at OSP during Phases 1 and 2 are similar to those in Alternative 1. In summary, additional grit removal will be provided in the pretreatment process, and a thermal hydrolysis facility will be constructed at OSP to provide solids pretreatment. In the event that effluent disinfection is required, a UV facility will be constructed to disinfect secondary effluent in Phase 3. Primary effluent from wet-weather flows will be disinfected using the existing chlorination and dechlorination facilities. All treated effluent will be discharged to the ocean through SWOO with improvements made to increase capacity to 300 mgd to reduce Westside near shore discharges. The bulk of these improvements are included in Phase 3.

Upgrades and improvements to SEP during all three phases are similar to those made in Alternative 1, including new wet-weather headworks, refurbishment of the primary clarifiers, improvements to secondary treatment, a new UV disinfection facility, and visual mitigation. All SEP effluent will be discharged to the Bay through a NSBO, which will have a capacity of 400 mgd. Solids generated at SEP will be transported to and treated at BBC. BBC will again be located at the Islais Creek site (between Evans Avenue and Islais Creek) or at the Pier 94 Backlands, or solids treatment will remain at the existing SEP site, and the BBC solid treatment processes will be the same as those outlined in Alternative 1.

3.3 Alternative 3: Treat all Dry Weather Flows at OSP

In Alternative 3 all Bayside dry-weather flows will be diverted and treated at a new plant near OSP, relieving dependence on SEP. SEP will be converted to a wet-weather facility only. All improvements detailed in Alternative 1, Phase 1 and 2 will be incorporated in Alternative 3.

In Phase 3 of Alternative 3, all dry-weather flows from the Bayside will be transported to the Westside through a new force main from SEP. A new Oceanside Plant (NOSP) will be constructed next to the current OSP and will treat the flows from the Bayside. Additional area to the north and east of the existing OSP will need to be acquired for the new plant. Preliminary treatment at NOSP will include centrifugal lift pumps, bar screens, and vortex grit units for grit removal. Primary treatment will consist of conventional primary sedimentation basins, and secondary treatment will be provided through high purity oxygen activated sludge and stacked rectangular clarifiers. Although effluent disinfection is not currently required for ocean discharge through SWOO, it is anticipated that disinfection may be required in the future. Secondary effluent disinfection will be achieved through a high-output low-pressure UV system. NOSP effluent will be conveyed to the Junction Box

at existing OSP for gravity discharge to SWOO that will be refurbished to allow for discharge of 300 mgd.

New solids handling facilities will also be included as part of the NOSP and will be located on the southeastern portion of the property that is currently occupied by the National Guard Armory. These facilities will contain similar treatment processes as the BBC. It is envisioned that the solids handling facility will be built during the first phase. While the liquid treatment components will be added during Phase 3, it is envisioned that the solids handling facility will be built during the first phase.

In Alternative 3, the existing OSP will continue to provide treatment for Westside flows. Improvements to existing OSP are similar to those in Alternative 2. In summary, additional grit handling capacity for wet-weather grit events will be provided, a UV facility will be constructed to disinfect secondary effluent, and a thermal hydrolysis facility will be constructed at the existing OSP to provide solids pretreatment.

In Alternative 3, all Phase 1 and 2 improvements to SEP detailed in Alternative 1 will be implemented. In Phase 3, a new influent pump station will be constructed at SEP to pump dry-weather flow to NOSP, and the existing SEP will be maintained as a wet weather facility. All wet-weather flows at SEP will be disinfected in a new chlorine contact channel. The channel will be constructed in the current secondary clarifier area (built after flows are transferred to NOSP in Phase 3), which will provide mitigation by limiting odor potential at the plant perimeter. Modifications and improvements made to NPF in Alternative 3 are similar to those made in Alternative 1. The capacity of NPF will be increased to 240 mgd and the primary clarifiers will be refurbished. Following treatment, NPF effluent will be discharged through a new deep-water outfall.

3.4 Alternative 4: Relocate SEP to New Bayside Site

In Alternative 4 SEP will be eliminated, and a new treatment facility and biosolids facility will be constructed on the Bayside during Phase 3. All improvements detailed in Alternative 1, Phase 1 and 2 will be incorporated in Alternative 4.

In Phase 3 of Alternative 4 a new Bayside Plant (NBP) will be constructed on the Bayside to treat dry and wet-weather flows currently treated at SEP. This new plant will replace SEP and eliminate current odor, noise, and visual impacts to the neighborhood surrounding SEP. NBP will be designed and visually screened to minimize neighborhood impacts. Preliminary treatment at NBP will include bar screens and aerated grit tanks, and primary treatment will consist of conventional primary clarifiers. NBP will include secondary treatment, and a high-pressure low-output UV system will disinfect secondary effluent while wet-weather primary effluent will be disinfected with chlorine. Treated effluent will be discharged through a new Bayside Outfall, constructed during Phase 2. Solids generated at NBP will be treated at BBC, which will also be located at the same site. Solid treatment facilities at BBC are the same as those outlined in Alternative 1. Interim improvements to

SEP outlined in Alternative 1 (Phases 1 and 2) would be implemented. As part of Alternative 4, SEP will be converted to a pumping facility that conveys wastewater to NBP and will not retain any treatment capacity at the current site.

In Alternative 4, the capacity of the NPF will be increased to 240 mgd. Additional improvements to NPF include refurbishment of the primary clarifiers. Following treatment, NPF effluent will be discharged through a new deep-water outfall.

OSP will continue to provide treatment for Westside dry- and wet-weather flows. Additional grit handling capacity for wet-weather grit events will be provided. A thermal hydrolysis facility will be constructed at OSP to provide solids pretreatment to assure continued land application or other reuse applications. SWOO will be refurbished to allow for discharge of 300 mgd.

4.0 FUTURE FACILTY IMPROVEMENT OPTIONS

Additional treatment improvements and upgrades have been included as future potential projects. Increasingly stringent discharge requirements may result in the need for advanced treatment, such as MBR, for Bayside flows. Alternatively, these flows could also be diverted to the Westside and decanted at SWOO. Advanced biosolids treatment, such as thermal drying of biosolids may also be needed to allow for more flexible and sustainable biosolids reuse and disposal.

Table 4 Master Plan Facility Alternatives Summary Table
2030 Sewer System Master Plan
City and County of San Francisco

CIP	ALTERNATIVES			
	1	2	3	4
Southeast Plant or New Bayside Plant	Odor Control Improvements Architectural and Landscape Screening Refurbish Influent Pump Station New Headworks Refurbish Primary Clarifiers High Purity Oxygen Upgrades Refurbish Secondary Clarifiers New UV Disinfection (2^o) **Total Flow Capacity, 400 mgd**	Odor Control Improvements Architectural and Landscape Screening Refurbish Influent Pump Station New Headworks Refurbish Primary Clarifiers High Purity Oxygen Upgrades Refurbish Secondary Clarifiers New UV Disinfection (2^o) **Total Flow Capacity, 400 mgd**	Odor Control Improvements Architectural and Landscape Screening New Influent Pump Station New Headworks Refurbish Primary Clarifiers New Chlorine Disinfection Facilities New UV Disinfection (2^o) **Total Flow Capacity, 400 mgd**	All Improvements in Alternative 1 to existing site *New Bayside Site* *New Influent Pump Station* *New Preliminary Treatment* *New Primary Clarification* *New Secondary Treatment* *New Chlorine & UV Disinfection (2^o)* *New Administration Building* *Total Flow Capacity, 400 mgd* New Pumping Facility at SEP
New Bayside Biosolids Center (BBC) or New OSP Biosolids Center	New Pier 94 or Islais Creek Site, or existing SEP site New Gravity Belt Thickeners New 6 Digesters New Pasteurization Tanks New Dewatering New Gas Handling New Energy Recovery New Odor & Chemical Systems	New Pier 94 or Islais Creek Site, or existing SEP site New Gravity Belt Thickeners New 6 Digesters New Pasteurization Tanks New Dewatering New Gas Handling New Energy Recovery New Odor & Chemical Systems	*Armory Relocation* *New Gravity Belt Thickeners* New 6 Digesters *New Pasteurization Tanks* *New Dewatering* *New Gas Handling* *New Energy Recovery* *New Odor & Chemical Systems*	New Bayside Site New Gravity Belt Thickeners New 6 Digesters New Pasteurization Tanks New Dewatering New Gas Handling New Energy Recovery New Odor & Chemical Systems
Oceanside Plant or New Oceanside Plant	Additional Grit Removal New Solids Pretreatment **Total Flow Capacity, 65 mgd**	Additional Grit Removal New Solids Pretreatment New UV Disinfection (2^o) **Total Flow Capacity, 65 mgd**	*Auxiliary Zoo Facilities Relocation* *New Preliminary Treatment* *New Primary/Secondary Clarification* *New MBR Facility* *New UV (2^o) and Chlorine Disinfection* ***Total Capacity (New), 150 mgd*** Grit Removal (OSP) New UV Disinfection (2^o) (OSP) New Solids Pretreatment (OSP) **Total Flow Capacity (OSP), 65 mgd**	Additional Grit Removal New Solids Pretreatment **Total Flow Capacity, 65 mgd**
North Point Facility or North Point Plant	Refurbish Primary Clarifiers New Chlorine Disinfection Facilities **Total Flow Capacity, 240 mgd** New Force Mains-CHS and NSS New Pumps-CHS and NSS	*New Seawall Lot 314 Site* *New Pretreatment* *Refurbish Primary Clarifiers* *New Activated Sludge, MBR* *New UV Disinfection* *New Chlorine Disinfection Facilities* ***Total Flow Capacity, 266 mgd*** New Force Mains-CHS and NSS New Pumps-CHS and NSS	New Pretreatment Refurbish Primary Clarifiers New Chlorine Disinfection Facilities **Total Flow Capacity, 240 mgd** New Force Mains-CHS and NSS New Pumps-CHS and NSS	New Pretreatment Refurbish Primary Clarifiers New Chlorine Disinfection Facilities **Total Flow Capacity, 240 mgd** New Force Mains-CHS and NSS New Pumps-CHS and NSS
Outfalls	New SE Bay Outfall – **400 mgd** New NP Outfall – **240 mgd** SWOO Backflow Prevention – **300 mgd**	New SE Bay Outfall – **400 mgd** New NP Outfall – **240 mgd** SWOO Backflow Prevention – **300 mgd**	New SE Bay Outfall – **400 mgd** New NP Outfall – **240 mgd** SWOO Backflow Prevention – **450 mgd**	New SE Bay Outfall – **400 mgd** New NP Outfall – **240 mgd** SWOO Backflow Prevention – **300 mgd**
Intertie	Sludge Pipe, SEP to BBC	Cayuga Diversion Sludge Pipe, SEP to BBC Sludge Pipe, NPP to BBC Increased Decant at OSP	Force Main, SEP to OSP Sludge Pipe, SEP to BBC	Sludge Pipe, SEP to BBC Force Main, SEP to New Bay Plant