MILL VALLEY

SASM

Sewerage Agency Southern Marin



Wastewater Treatment Plant

MASTER PLAN

REPORT | DECEMBER 2014

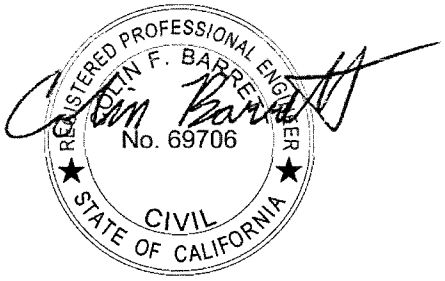
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SEWERAGE AGENCY OF SOUTHERN MARIN
WASTEWATER TREATMENT PLANT MASTER PLAN

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12/20/2014

SEWERAGE AGENCY OF SOUTHERN MARIN
WASTEWATER TREATMENT PLANT MASTER PLAN

EXECUTIVE SUMMARY

FINAL
December 2014

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SEWERAGE AGENCY OF SOUTHERN MARIN
WASTEWATER TREATMENT PLANT MASTER PLAN

EXECUTIVE SUMMARY

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INTRODUCTION

The Sewerage Agency of Southern Marin (SASM) provides wastewater treatment and effluent disposal for SASM's six Member Agencies. The Member Agencies include the City of Mill Valley (City), Almonte Sanitary District, Alto Sanitary District, Homestead Valley Sanitary District, Richardson Bay Sanitary District, and the Kay Park Area of the Tamalpais Community Sanitary District. Each Member Agency owns, operates, and maintains its respective sanitary sewer collection system. The SASM Joint Powers Authority (JPA) owns and operates the wastewater treatment plant (WWTP), located in Mill Valley, and its associated wastewater collection systems. Figure ES.1 shows the limits of the SASM Member Agencies and location of the SASM WWTP.

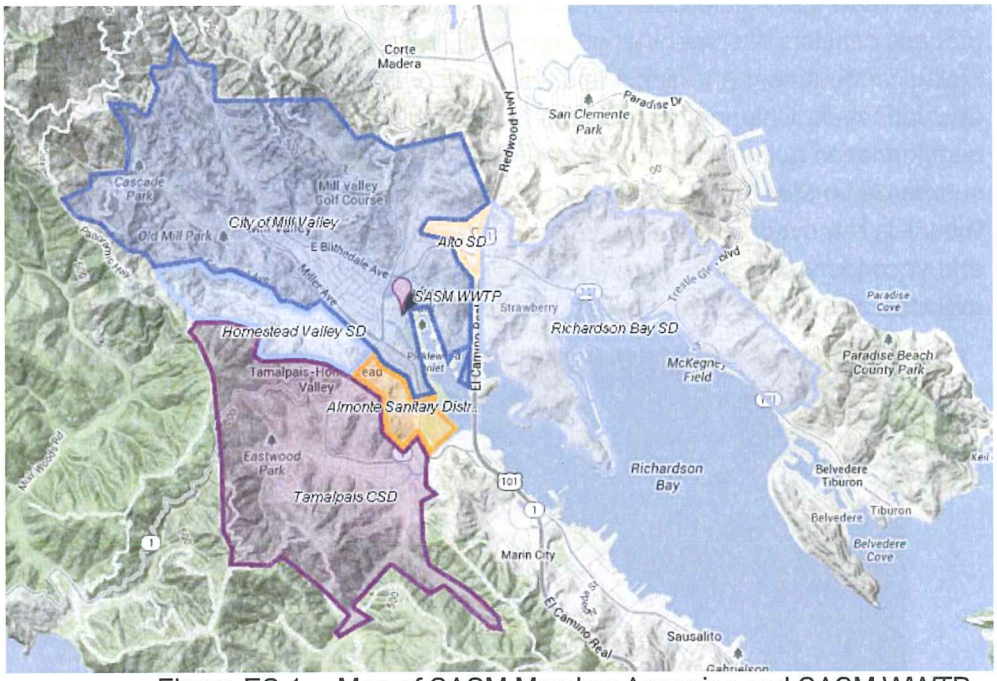


Figure ES.1 Map of SASM Member Agencies and SASM WWTP

In December 2013, SASM commissioned Carollo Engineers (Carollo) to prepare a Wastewater Treatment Plant Master Plan (MP). The purpose of the MP is to develop a "road map" for the next 25 years of WWTP improvements, including a list of necessary projects, an implementation schedule, and cost estimates. The "road map" is needed to ensure that capital funds are properly allocated to improvements that will benefit SASM in both the short and long term. The primary objectives of the MP planning process are to:

1. Evaluate the existing treatment processes for the capability of reliably meeting existing discharge requirements.

2. Evaluate the existing treatment system to meet potential future discharge requirements, such as stricter nutrient limits or reducing blending during wet weather flows.

3. Develop a prioritized 25-year capital improvements program (CIP) that phases projects and results in reasonable customer rate impacts.

4. Examine and recommend sustainable elements and strategies, which can be incorporated into the proposed CIP, that are complementary to SASM's policy initiatives.

EXISTING TREATMENT FACILITIES AND CONDITION

SASM treats raw wastewater from its six (6) member agencies. The WWTP's treatment process consists of screening, grit removal, flow equalization, primary sedimentation, biological treatment (trickling filters), secondary clarification, disinfection (chlorination), and dechlorination. Chlorine contact time is accomplished in the effluent outfall, and dechlorination occurs prior to discharge to Raccoon Strait in the San Francisco Bay via a submerged outfall that is jointly shared with the Sanitary District No. 5 of Marin County. Biosolids removed from the wastewater stream are treated by gravity thickening, primary and secondary digestion, and dewatering by belt filter press. Figure ES.2 shows an overview of the WWTP and treatment processes.



Figure ES.2 Aerial View of WWTP Treatment Processes

The WWTP was first constructed in 1954 as a primary plant and underwent a major upgrade and expansion in 1984. Smaller upgrade projects have been completed since, including an equalization basin expansion in 2012. An assessment of the physical condition of the existing mechanical and electrical equipment and structures was performed as part of this MP. Estimates of replacement timing were made based on observed condition, as well as the asset's installation date. Useful life is the number of years an asset is anticipated to be in service as a function of asset type (i.e., mechanical, structural, electrical, instrumentation and control). Remaining useful life was estimated based on a combination of the International Infrastructure Management Manual (IIMM), Edition 2006, USEPA guides, other industry references, previous studies completed for SASM, and Carollo's experience.

The overall findings of the condition assessment are that many of the WWTP structures and equipment are nearing the end of their useful life. Collectively, if the aging facilities are allowed to continue to deteriorate without improvements, the ability of the WWTP to meet current discharge requirements will be jeopardized. (See Figure ES.3)



Figure ES.3 Large Cracks in North Wall of Primary Clarifiers and Evidence of Leakage through Construction Joint in the Wall of Digester No. 2

SUITABILITY OF THE EXISTING WWTP SITE FOR FUTURE USE

When SASM was formed in the early 1980s to consolidate wastewater treatment facilities for the Member Agencies, the City of Mill Valley's existing wastewater treatment plant on Sycamore Avenue was selected for expansion. This site is suitable to treat wastewater from each Member Agency because it is relatively central to all Member Agencies and is located at a low elevation, which minimizes the need for long pipelines and pumping. The City of Mill Valley also owned the 8.34 acre property at this location and was City was willing to lease the site to SASM.

Moving the WWTP to another location within the service area was not considered as part of the Master Planning process for the following reasons:

- The service area is heavily developed and there does not appear to be any available contiguous properties of large enough area and at a relatively low elevation for a new WWTP. Even if another suitable property was available, the high property values in the service area would make the cost of a contiguous 8-10 acre property suitable for development excessively high.
    - There are several large parks along the shoreline near the existing WWTP. However, it is assumed that constructing a wastewater treatment plant on existing parkland is not viable.
- Constructing a new WWTP at another site would likely encounter opposition from nearby property owners and other stakeholders as wastewater plants are, in general, not likely to positively affect nearby property values. In addition, the perception that wastewater plants generate unpleasant odors would make construction of a new wastewater plant in a developed residential or commercial area difficult.

Therefore, the Master Plan focuses on improvements to the existing WWTP on Sycamore Avenue.

POPULATION, FLOWS AND LOADS PROJECTIONS

The current average dry weather flow (ADWF) to the WWTP is 2.22 million gallons per day (mgd), and the service area population is 29,000. Based on population projections developed by the Association of Bay Area Governments, the service area population is expected to grow by only 5 percent between now and 2035. At this rate, the ADWF by the year 2035 will be 2.34 mgd.

During wet weather, the wastewater collection system receives a significant amount of extraneous flows, known as infiltration and inflow (I&I). Sources of I&I include collection system leaks and defects in service laterals. As evidenced by high salinity concentrations in the SASM wastewater, some of the extraneous flow comes from San Francisco Bay water that leaks into sewers near the bay shoreline. Because of high I&I contributions, the Peak hourly wet weather flow (PHWWF) of 32.7 mgd, for a wet weather event with a 20-year recurrence interval, is over 14 times higher than the ADWF. As SASM and its Member Agencies are actively pursuing I&I reduction projects, no increase in PHWWF is projected throughout the planning period.

Wastewater loadings (biochemical oxygen demand [BOD_5] and total suspended solids [TSS]) were assumed to remain at current concentrations throughout the planning period. Wastewater flow and loading projections are summarized in Table ES.1.

Table ES.1 Summary of Wastewater Flows and Characteristics Wastewater Treatment Plant Master Plan Sewerage Agency of Southern Marin								
		Existing Conditions[1]				Projected 2035 Values		
Parameter	Units	ADW	ADA	ADMM		ADW	ADA	ADMM
Flow	mgd	2.22	2.67	4.19		2.34	2.81	4.41
BOD_5	mg/L	253	213	--		253	213	--
	lb/d	4557	4686	6,167		4,803	4,939	6,500
TSS	mg/L	323	271	--		323	271	--
	lb/d	5,811	5,984	7,689		6,125	6,307	8,104
Minimum Hour Dry Weather Flow		0.40 mgd				0.42 mgd		
Peak Hour Dry Weather Flow		4.67 mgd				4.92 mgd		
Peak Hour Wet Weather Flow		32.7 mgd				32.7 mgd		

Note:

(1) Flows represent Average Dry Weather Flow (ADWF), Average Day Maximum Month Flow (ADMMF), Average Daily Annual Flow (ADAF) and loads in lb/d represent Average Dry Weather Load (ADWL), Average Day Maximum Month Load (ADMML), and Average Day Annual Load (ADAL).

CAPACITY ASSESSMENT

The NPDES permit rates the facility capacity at 3.6 mgd for ADWF and 24.7 mgd for PWWF. However, the influent pump station has a capacity of 32.8 mgd and when flows exceed 24.7 mgd, excess wastewater flows are diverted to the equalization basins for treatment after the event. When the equalization basins are full, the excess flows are treated in the primary clarifiers and blended with the secondary effluent. The blended effluent must still meet the National Pollutant Discharge Elimination System (NPDES) permit discharge limits.

A hydraulic and process capacity assessment was performed to determine the capacity of the WWTP and outfall. The hydraulic analysis estimated that the WWTP and outfall have a firm hydraulic capacity of 23.5-25.2 mgd during wet weather events, depending on tide events. The process analysis showed that the WWTP can adequately treat an ADWF of up to 2.77 mgd under maximum month load conditions to current discharge standards when all units are in service. Because the projected ADWF is 2.34 in 2035, the WWTP does not have to be expanded or improved to meet ADWF flows. However, capacity improvements are required to meet the PHWWF of 24.7 mgd.

CURRENT AND FUTURE DISCHARGE REQUIREMENTS

SASM's current NPDES discharge permit was issued in December 2012. In addition, SASM is required to comply with a NPDES discharge permit issued to all San Francisco Bay Dischargers in April 2014. Key permit requirements include:

- Specific tasks that must be taken to improve wet weather management and reduce blending. The tasks include development of a wet weather flow management plan and initiatives to reduce I&I at private laterals.
- Notification that the ammonia limits may decrease in future permits.
- Participation in a regional study to evaluate potential nutrient discharge reduction solutions at San Francisco Bay WWTPs.

Ammonia and Nitrogen Limits

The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards (RWQCBs) have recently approved permits throughout California with stricter discharge limits for ammonia, nitrogen, and phosphorous. In addition, the RWQCB has issued a Nutrient Watershed Permit for San Francisco Bay Dischargers, which may be a prelude to stricter discharge limits. Over the next several NPDES discharge permit cycles (5-year renewal cycles), the RWQCB may grant less dilution credit or change the nutrient limitations in other ways to address growing concerns about nutrients in the receiving water. Accordingly, the MP provides methods for complying with stricter nutrient limits in the future.

Wet Weather Blending of Primary and Secondary Effluent

The RWQCB may continue to allow blending of primary effluent with secondary effluent during wet weather events for the foreseeable future, if there is no feasible alternative. However, should the EPA or the RWQCB not accept SASM's No Feasible Alternatives (to blending) Analysis, SASM may have to stop blending. Accordingly, this Master Plan evaluates alternatives to reduce blending in the future.

STRATEGIES TO MEET FUTURE NEEDS

There are several categories of projects that are needed to meet future needs, capacity requirements and to satisfy district goals.

Maintain Reliability with Rehabilitation and Replacement Projects

While the WWTP has performed well since its last major upgrade 30 years ago, many of the WWTP facilities and equipment are nearing the end of their useful lives. Therefore, many of the facilities and equipment require rehabilitation and/or replacement (R&R) over the planning period. These R&R projects are presented within the master plan.

Some of the major projects under this category include:

- Headworks Rehabilitation.
- Trickling Filter Media and Distributor Arm Rehabilitation.
- Electrical Systems Upgrades (including replacement of standby generators).
- Digester Improvements.
- Primary and Secondary Clarifier Upgrades.

Increase Flow Capacity for the Effluent Conveyance Pipeline & Outfall

Hydraulic calculations indicate that the effluent pump station, conveyance pipeline, and outfall system has a firm capacity between 23.2 and 25.2 mgd, depending on tide conditions. Since the WWTP must be able to convey 24.7 mgd of wet weather flows during all conditions, improvements are recommended to increase the firm capacity of the system. These improvements include construction of a second effluent flow meter to mitigate a hydraulic bottleneck, and replace of the outfall diffusers to increase outfall capacity.

Plan for Future Nutrient Limits

The RWQCB has indicated that ammonia limits may decrease and new nitrogen limits may be imposed in the future. Accordingly, during the planning process, several alternatives to meet these future limits were developed and alternatives. The alternatives included the addition of treatment processes to the end of the existing processes and complete replacement of the existing primary and secondary processes with a new treatment system. A life cycle analysis determined that the addition of nitrifying trickling filters to further reduce ammonia and a denitrifying filtration system was the most viable treatment alternative. Equally importantly, the additional treatment processes can be phased so that only the nitrifying trickling filter has to be constructed if a stricter ammonia discharge limit is implemented before nitrogen discharge limits. Implementation of this alternative would require acquisition of additional property to the west of the WWTP site from the Mt. Tamalpais United Methodist Church.

Reduce Primary/Secondary Effluent Blending in the Future

Blending of primary effluent with secondary effluent during peak wet weather flows may not be allowable in the future. In other words, all discharges to the bay during peak wet weather flows may eventually require secondary treatment. The recommended strategy to address this possibility is to expand the equalization basins by approximately 1.75 MG. This would not eliminate blending in all wet weather conditions but would increase equalization storage and reduce blending events significantly. If SASM's ongoing I&I reduction efforts are successful, then this project may not be necessary.

Protect the WWTP from Flooding

The WWTP is at risk of flooding due to 100-year flood events and sea level rise. To protect the WWTP against a 100-year flood, building a berm around the northern and western parts of the facility is recommended. This project should be implemented in coordination with local and regional flood protection measures currently being studied by the Marin County Flood Control and Water Conservation District.

Provide Sustainable Elements in the Proposed Projects

Improvements to the reliability and performance of the treatment plant, as outlined above, benefit the environment by reducing pollutant loadings on the San Francisco Bay. In addition to this key benefit, potential sustainable elements that could be incorporated into the recommended Master Plan improvements were identified. Some of the potential sustainable elements that could be implemented in projects at the WWTP include:

- Installation of high efficiency outdoor lighting.
- Electrical demand reduction through installation high efficiency equipment and, efficient hydraulic and treatment systems.
- Expansion of recycled water systems to offset potable water use (studied in a separate report).

RECOMMENDED IMPROVEMENTS

The recommended improvements are categorized into 7 groups:

- Group 1 – R&R Improvements to Maintain Overall Reliability.
- Group 2 – Capacity Improvements to Treat Existing and Future Flows/Loads.
- Group 3 – Flood Mitigation and Sustainability Projects.
- Group 4 - Improvements Required if Ammonia Removal is Required.
- Group 5 - Improvements Required if Nitrogen Removal is Required.
- Group 6 - Improvements Required if Blending is Prohibited.
- Group 7 – Recycled Water Expansion Project.
- Group 8 – Collection and Conveyance System Improvements.

Group 1 - R&R Improvements to Maintain Overall Reliability

Approved Projects in Fiscal Year (FY) 2015 Budget

These are projects that are recommended in the Master Plan and have already been approved by SASM. The approved projects are summarized in Table ES.2:

Table ES.2 Summary of Repair and Replacement Projects Approved for Fiscal Year 2015 Wastewater Treatment Plant Master Plan Sewerage Agency of Southern Marin		
	Project	**Reason/Notes**
1.1	Upgrade MCC-1 and MCC-1A	Electrical safety improvements
1.2	Replace Cover of Digester No. 1	Existing cover is corroded
1.3	Rehabilitate Headworks	Replacement and improvements to obsolete screenings and grit removal equipment as well as safety improvements.
1.4	SCADA/PLC Upgrade Project Phase 3	Last phase to upgrade the WWTP's outdated Supervisory Control and Data Acquisition (SCADA) system and Programmable Logic Controllers (PLCs).
1.5	Rehabilitate Effluent Pipeline Rectifiers and ARVs	Rehabilitates cathodic protection and replacement of corroded air release valves (ARVs.
1.6	Replace Isolation Gates	Replaces severely corroded isolation gates at the secondary clarifiers.

Projects Recommended for Near-Term Implementation (5 yr CIP)

We recommend that the projects summarized in Table ES.3 be implemented in the next five years. The purpose of these projects is to allow the WWTP to continue to meet discharge requirements in a safe and reliable manner. These projects were selected based on a condition assessment performed for the Master Plan in February 2014.

Projects Recommended for Long Term Implementation (25 yr CIP)

We recommend that the projects summarized in Table ES.4 be implemented after completion of the near term projects. Several of these projects are not recommended to be implemented until well into the future, as shown in the Capital Improvements Plan (CIP) in the following section. Similar to the projects discussed above, these projects also improve the ability of the WWTP to meet discharge requirements in a safe and reliable manner.

Table ES.3 Summary of Near-Term Repair and Replacement Projects (5 yr CIP) Wastewater Treatment Plant Master Plan Sewerage Agency of Southern Marin	
Project	**Reason/Notes**
1.7 Primary Clarifier Rehabilitation	Replace sludge collector drives and gearboxes and primary sludge/scum pumps. Rebuild primary clarifier influent box would be rebuilt and MCC-4 would be upgraded.
1.8 Trickling Filter Project Phase 1	The existing trickling filter media and distributor arms are approximately 30 years old and at the end of their useful life. First phase replaces top few layers of media in one of the trickling filters.
1.9 Trickling Filter Project Phase 2	Depending Phase 1, this project may be implemented or delayed. Includes replacing all of the remaining, 30-year old media in the trickling filters, and an structural assessment of walls.
1.10 Trickling Filter and Effluent Pump Station Upgrade	The effluent pump motors and isolation gates at this pump station are due for replacement.
1.11 Secondary Clarifier Upgrade	Improvements needed to address aging condition and to prevent flooding during peak flows.
1.12 Effluent Conveyance Pipeline	Relocation of the sodium hypochlorite injector, and replacement of the sodium hypochlorite tank and a new containment basin.
1.13 Emergency Outfall Improvements	Improvements to repair a hole in the pipeline under the tidal slough adjacent to the WWTP and to replace the emergency outfall isolation gate.
1.14 Digester Upgrade Project	The cover for Digester No. 2 needs to be recoated and several corroded steel elements need replacement. In addition, one of the boilers/heat exchangers and the biogas piping needs to be replaced. MCC-3 is upgraded.
1.15 Dewatering Storage Improvements	Improvements to the belt filter press conveyor and bins to allow the dewatering room door to be closed for proper ventilation and odor control.
1.16 Electrical System Upgrades	Replacement of the 2-cycle standby generators and upgrades to the main switchgear, which distributes electricity to MCCs.
1.17 Miscellaneous Plant wide Improvements	This project includes new OSHA compliant handrail and guardrail at several locations in the WWTP. In addition, an upgrade of the Administration Building's conference room is included.

Table ES.4 Summary of Long-Term Repair and Replacement Projects (25 yr CIP) Wastewater Treatment Plant Master Plan Sewerage Agency of Southern Marin	
Project	**Reason/Notes**
1.18 Replace Influent Pumps:	Replacement of the influent pumps due to age.
1.19 Replace Primary Clarifiers:	In 2030, the primary clarifier will be approximate 75 years old, well past their useful life.
1.20 Rehabilitate Trickling Filter Walls and Replace Distributors:	It is anticipated that the trickling filter walls and distributors will need to be replaced in 2025.
1.21 – Replace Secondary Clarifier Mechanisms:	The secondary clarifier mechanisms will be due for replacement in 2025.
1.22 – Replace Sludge Thickener Mechanisms and Pumps:	While in good condition now, the sludge thickener mechanism and pumps will be due for replacement in 2025.
1.23 – Replace Digesters:	The digesters will be well past their useful life by 2030.
1.24 – Replace Instruments and Analyzers:	Replacement of analytical analyzers and sampling equipment.

Groups 2 to 7

The recommended projects for Groups 2 – 7 are summarized in Table ES.5.

Table ES.5 Summary of Recommended Projects for Groups 2 through 7
Wastewater Treatment Plant Master Plan
Sewerage Agency of Southern Marin

Category	Project	Reason/Notes
Group 2 - Capacity improvement projects are required to treat existing and future flows and loads. Specifically they are related to providing enough effluent discharge capacity to allow the WWTP to operate at its rated secondary treatment capacity of 24.7 mgd under all conditions.	2.1 Replace Outfall Diffusers	The diffusers in the shared outfall with Sanitary District No. 5 of Marin County would be replaced with new, lower headloss, higher flow diffusers.
	2.2 Add Second Effluent Magnetic Flow Meter	A second flow meter would be installed in parallel to the existing effluent flow meter to resolve a hydraulic bottleneck at this location. Automated valves would allow one flow meter to be taken offline during dry weather periods
Group 3 - Flood mitigation and sustainability projects are recommended to protect the WWTP from flooding and improve energy efficiency at the WWTP.	3.1 Flood Protection Berms for 100-year Floods	New berms and earthwork at the WWTP entrance gates would be constructed to protect the WWTP from 100-year floods.
	3.2 Sustainability and Energy Efficiency	Installation of high efficiency outdoor lighting to improve energy efficiency, working conditions, and security.
Group 4 - Remove ammonia if the RWQCB requires additional ammonia removal in the future.	4.1 Nitrifying Trickling Filter	Construction of a nitrifying trickling filter (NTF) and a NTF feed/recirculation pump station to remove ammonia if required.

Table ES.5 Summary of Recommended Projects for Groups 2 through 7 Wastewater Treatment Plant Master Plan Sewerage Agency of Southern Marin		
Category	**Project**	**Reason/Notes**
Group 5 - Remove nitrogen from the effluent if the RWQCB requires nutrient removal in the future.	5.1 Denitrifying Filter	Construction of a denitrifying multi-media filter system to remove nitrogen from the effluent if required.
Group 6 - Reduce blending if the RWQCB prohibits blending of primary and secondary effluent during wet weather events in the future.	6.1 Expand Equalization Basins	If the RWQCB prohibits blending of primary and secondary effluent during wet weather events, the equalization basins could be expanded in volume by 1.5 to 2.0 MG by constructed a pile-supported wall around the perimeter of the basins.
Group 7- Expand the recycled water facilities to offset potable water use in the vicinity of the WWTP.	7.1 Recycled Water	Expansion of the recycled water treatment and distribution system. This would offset potable water use by primarily irrigation customers. Funded by MMWD. If this project is not implemented, then an R&R project would be required to improve the existing recycled water production facilities, as they are nearing the end of their useful life.

Group 8 - Collection and Conveyance System Improvements

The projects were developed by Nute Engineering and include a variety of recommended improvements to SASM's conveyance system pump stations and pipelines. The project titles are summarized in Table ES.6 below. Full descriptions of each project are included in the reports in Appendix A.

Table ES.6 Summary of Collection and Conveyance System Projects[1]
Wastewater Treatment Plant Master Plan
Sewerage Agency of Southern Marin

Project	Project Cost
Replace Sutter Manor Pump Station	$884,144
Reliability Upgrades to Four Pump Stations	$339,841
Upgrade MCCs at Three Pump Stations	$1,535,215
Raise Motors at Salt Works Pump Station	$279,130
Convert Camino Alto PS to Submersible Type PS	$1,256,085
Miscellaneous Pump Station Improvements	$279,130
Almonte Blvd Sewer Lining	$150,000
Camino Alto Sewer Lining	$262,500
Sycamore Ave Sewer Lining	$31,250
Miller Ave Sewer Lining	$143,750
Sycamore Trunk Sewer Replacement	$3,750,000
Camino Alto Force Main Extension	$437,500
Trestle Glen, Salt Works, Ricardo Rd Force Main Improvements	$312,500
Private Lateral Replacement Project	$125,000

Note:

(1) Based on cost estimates provided by Nute Engineers. Includes 25% contingency for engineering and administrative costs.

CAPITAL IMPROVEMENT PLAN

The recommended CIP encompasses all eight groups of recommended projects.

Cost Estimates

The cost estimates for the expansion, addition, and/or rehabilitation of WWTP facilities have been prepared for guidance in the evaluation of each alternative. The final project costs will likely vary from the cost estimates presented in this Master Plan. Table ES.7 summarizes the project costs for each group of the Master Plan projects. Table ES.8 shows all of the recommended projects and the recommended implementation schedule. Figure ES.4

shows a visual depiction of all of the projects. Figure ES.5 shows the projected capital expenditures over the next 20 years.

Table ES.7 Summary of Collection and Conveyance System Projects[1]
Wastewater Treatment Plant Master Plan
Sewerage Agency of Southern Marin

Phase		Project Costs (Millions of Dollars)
Group 1	R&R Projects	$31.5
Group 2	Improvements Required to Treat Existing and Future Flows/Loads	$1.4
Group 3	Flood Mitigation and Sustainability Projects	$0.6
Group 4	Improvements Required if Ammonia Removal is required by RWQCB	$8.0
Group 5	Improvements Required if Nitrogen Removal is Required by RWQCB	$9.9
Group 6	Improvements Required if Blending is Prohibited by the RWQCB	$3.7
Group 7	Recycled Water Expansion Project	$2.8[2]
Group 8	Collection/Conveyance System Improvements	$9.8
	Total	$64.8

Notes:

(1) Based on June 2014 dollars; SF ENRCCI = 10895.

(2) The cost of the recycled water expansion project is shown but is not included in the CIP total as SASM and MMWD are currently discussing cost sharing for this project.

Table ES.8 Wastewater Treatment Plan Master Plan - Capital Improvements Plan (CIP)
Wastewater Treatment Plant Master Plan
Sewerage Agency of Southern Marin

Project No.	Project	Project Cost[1]	2015	2016	2017	2018	2019	2020	2025	2030	2035
R&R Projects included in FY 2015 CIP											
1.1	Upgrade MCC-1 and MCC-1A (TF Feed/Recirc PS and Effluent PS)	$1,145,000	$629,750	$515,250							
1.2	Replace Cover of Digester No. 1	$604,000	$604,000								
1.3	Rehabilitate Headworks	$3,542,000	$175,000	$3,367,000							
1.4	SCADA/PLC Upgrade Project Phase 3	$50,000	$50,000								
1.5	Rehabilitate Effluent Conveyance Pipeline Rectifiers and ARVs	$250,000	$250,000								
1.6	Replace Isolation Gates at Secondary Clarifiers	$29,000	$29,000								
	Subtotal	$5,620,000									
R&R Projects Recommended for Near Term Implementation											
1.7	Primary Clarifier Rehabilitation Project	$985,000			$985,000						
1.8	Trickling Filter Project Phase 1	$604,000			$604,000						
1.9	Trickling Filter Project Phase 2 (if required)	$3,015,000				$3,015,000					
1.10	Trickling Filter & Effluent Pump Station Upgrade Project	$517,000			$517,000						
1.11	Secondary Clarifier Upgrade Project	$632,000			$632,000						
1.12	Effluent Conveyance Pipeline Improvements	$233,000				$233,000					
1.13	Emergency Outfall Improvements	$265,000			$265,000						
1.14	Digester Upgrade Project	$798,000			$798,000						
1.15	Dewatering Storage Improvements	$63,000			$63,000						
1.16	Electrical System Upgrades	$2,127,000		$2,127,000							
1.17	Miscellaneous Plant-wide Improvements	$401,000					$401,000				
	Subtotal	$9,602,000									
R&R Projects Recommended for Long Term Implementation											
1.18	Replace Influent Pumps	$1,369,000						$1,369,000			
1.19	Replace Primary Clarifiers	$7,560,000								$7,560,000	
1.20	Rehabilitate Trickling Filter Walls and Replace Distributors	$568,000								$568,000	
1.21	Replace Secondary Clarifier Mechanisms	$1,426,000							$1,426,000		
1.22	Replace Sludge Thickener Mechanism and Pumps	$548,000							$548,000		
1.23	Replace Digesters	$4,419,000									$4,419,000
1.24	Replace Instruments and Analyzers	$343,000							$343,000		
	Subtotal	$16,233,000									
Improvements Required to Treat Existing and Future Flows/Loads											
2.1	Replace Outfall Diffusers	$760,000					$760,000				
2.2	Add Second Effluent Magnetic Flow Meter	$652,000					$652,000				
	Subtotal	$1,412,000									
Flood Mitigation and Sustainability Projects											
3.1	Flood Projection Berms for 100-year Floods	$566,000						$566,000			
3.2	Sustainability & Energy Efficiency Projects (e.g. HE Outdoor Lighting)	$73,750						$73,750			
	Subtotal	$639,000									
Improvements Required if Ammonia Removal is required by RWQCB											
4.1	Construct Nitrifying Trickling Filter (NTF) and NTF Feed/Recirc PS	$8,000,000							$8,000,000		

Table ES.8 Wastewater Treatment Plan Master Plan - Capital Improvements Plan (CIP)
Wastewater Treatment Plant Master Plan
Sewerage Agency of Southern Marin

Project No.	Project	Project Cost[1]	2015	2016	2017	2018	2019	2020	2025	2030	2035
Improvements Required if Nitrogen Removal is Required by RWQCB											
5.1	Construct Denitrifying Filters and Supplemental Carbon System	$9,900,000								$9,900,000	
Improvements Required if Blending is Prohibited by the RWQCB											
6.1	Expand EQ Basins by 1.5 to 2.0 MG	$3,650,000					$3,650,000				
	Subtotal (All Regulatory Driven Projects)	$21,550,000									
Recycled Water Expansion Project[2]											
7.1	Construct New Treatment System and Expand Distribution System	$2,800,000[2]						$2,800,000			
Collection/Conveyance System Improvements[3]											
8.1	Replace Sutter Manor Pump Station	$884,000	$221,000	$663,000							
8.2	Reliability Upgrades to Four Pump Stations	$340,000		$340,000							
8.3	Upgrade MCCs at Three Pump Stations	$1,535,000				$1,535,000					
8.4	Raise Motors at Salt Works Pump Station	$279,000				$279,000					
8.5	Convert Camino Alto PS to Submersible Type PS	$1,256,000		$251,000	$1,005,000						
8.6	Miscellaneous Pump Station Improvements	$279,000					$279,000				
8.7	Almonte Blvd Sewer Lining	$150,000			$150,000						
8.8	Camino Alto Sewer Lining	$263,000			$263,000						
8.9	Sycamore Ave Sewer Lining	$31,000			$31,000						
8.10	Miller Ave Sewer Lining	$144,000				$144,000					
8.11	Sycamore Trunk Sewer Replacement	$3,750,000						$3,750,000			
8.12	Camino Alto Force Main Extension	$438,000			$438,000						
8.13	Trestle Glen, Salt Works, Ricardo Rd Force Main Improvements	$313,000				$313,000					
8.14	Private Lateral Replacement Project	$125,000	$50,000	$75,000							
	Subtotal	$9,786,000									
	Total Unescalated Project Costs	$64,881,000	$2,009,000	$7,338,000	$5,750,000	$5,519,000	$5,742,000	$5,759,000	$10,317,000	$18,000,000	$4,419,000
	Total Escalated Costs (3% inflation)		$2,069,000	$7,786,000	$6,283,000	$6,211,000	$6,657,000	$6,876,000	$14,281,000	$28,930,000	$8,221,000

Notes
1. 2014 Dollars (not escalated). Refer to TM No. 1 for the estimating contingencies used to calculate the project costs.
2. The cost of the recycled water expansion project is shown but is not included in the CIP totals as SASM and MMWD are currently discussing cost sharing for this project.
3. Based on cost estimates by Nute Engineers. Escalated to 2014 costs. Includes 25% contingency for engineering and administrative costs.

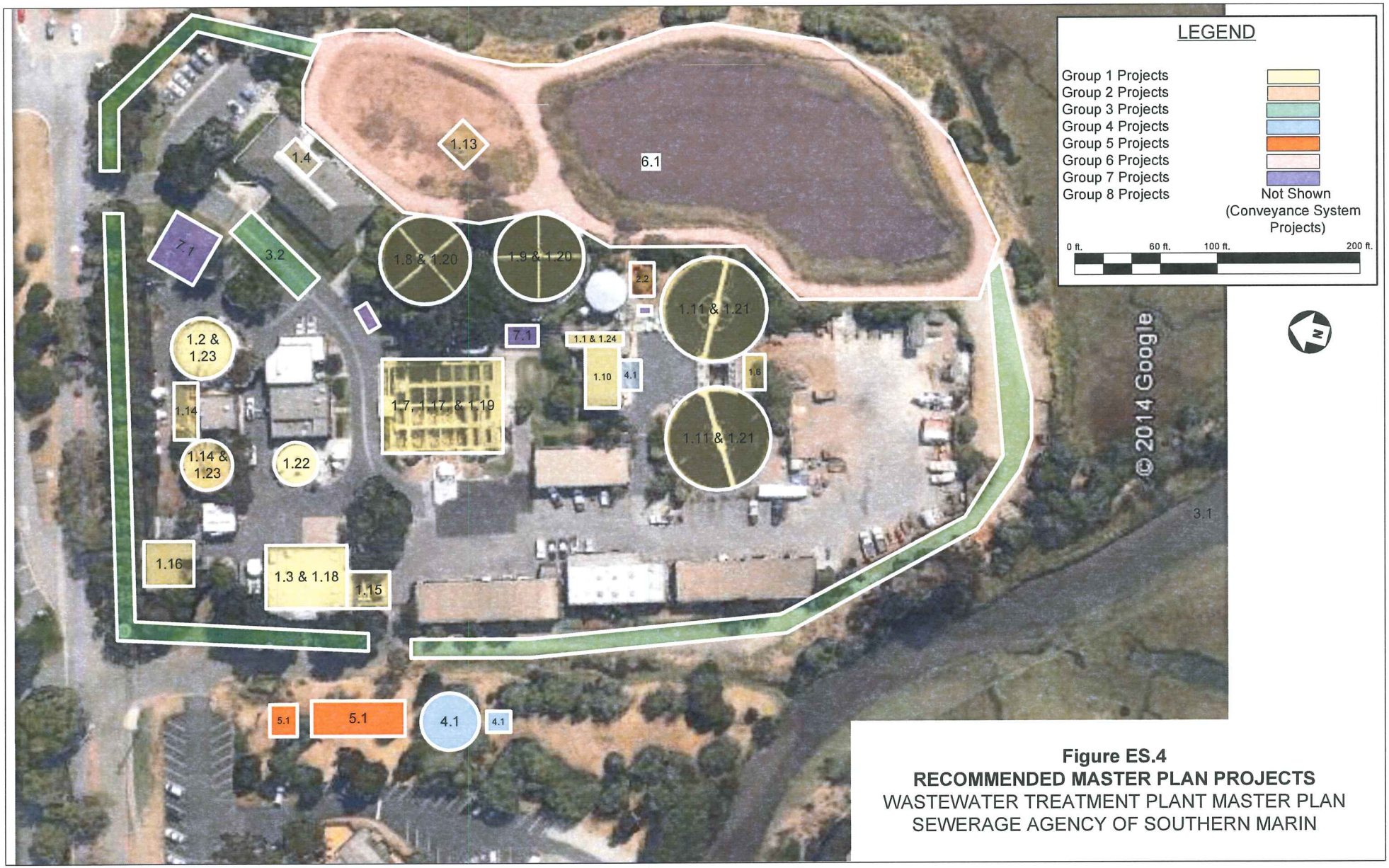


Figure ES.4
RECOMMENDED MASTER PLAN PROJECTS
WASTEWATER TREATMENT PLANT MASTER PLAN
SEWERAGE AGENCY OF SOUTHERN MARIN

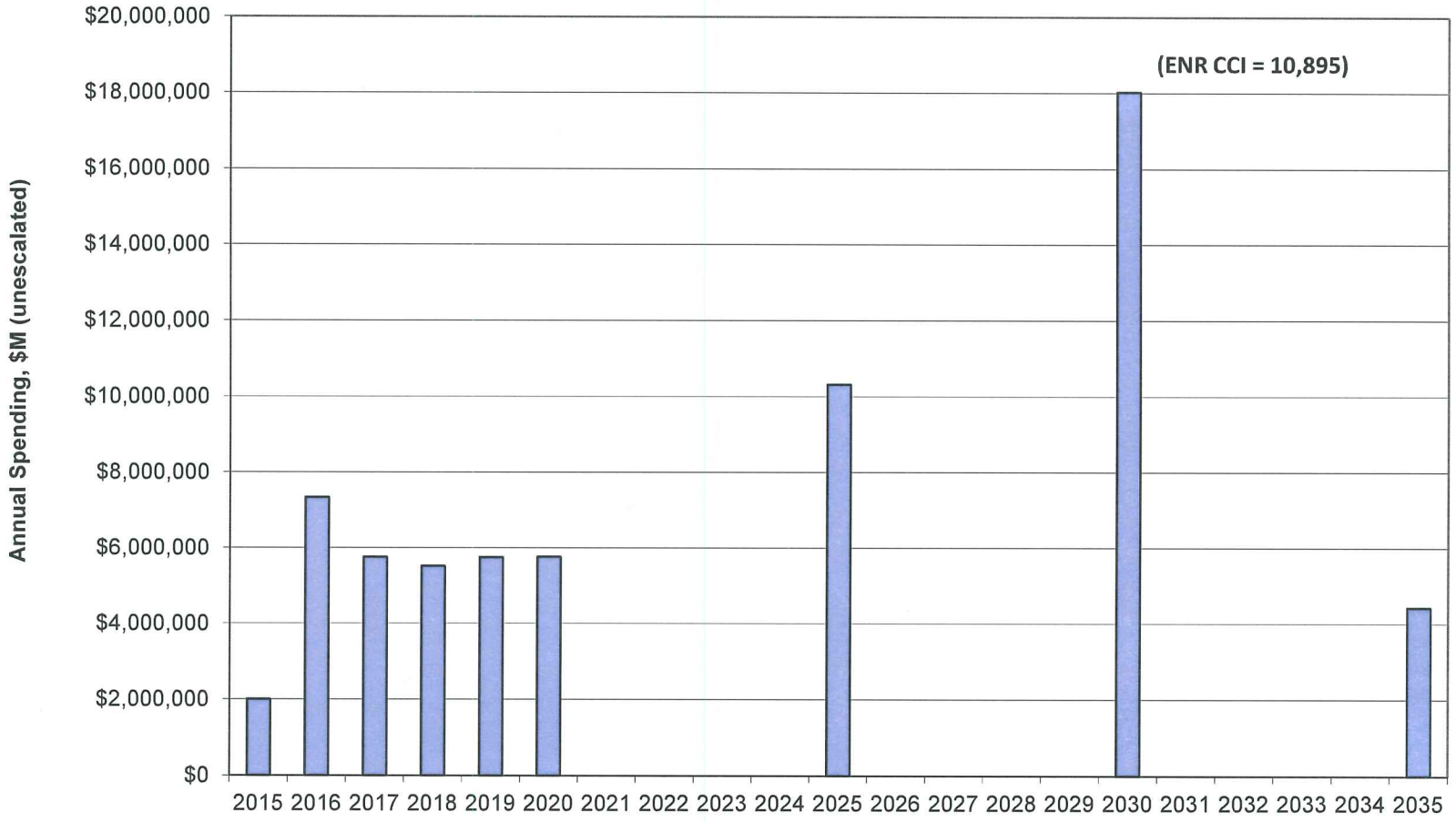


Figure ES.5
CAPITAL IMPROVEMENTS PLAN CASH FLOW SUMMARY
WASTEWATER TREATMENT PLANT MASTER PLAN
SEWERAGE AGENCY OF SOUTHERN MARIN