Recycled Water Feasibility Study

Central Marin Sanitation Agency

and

Marin Municipal Water District

January 2016 | carollo

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MARIN MUNICIPAL WATER DISTRICT/CENTRAL MARIN SANITATION AGENCY

RECYCLED WATER FEASIBILITY STUDY

FEASIBILITY STUDY REPORT

JANUARY 2016

FINAL

REGISTERED PROFESSIONAL ENGINEER
LYDIA A. HOLMES
No. 56616
CIVIL
STATE OF CALIFORNIA

01/07/2016

REGISTERED PROFESSIONAL ENGINEER
TRACY ANNE CLINTON
No. 48199
CIVIL
STATE OF CALIFORNIA

01/07/2016

REGISTERED PROFESSIONAL ENGINEER
COURTNEY L. EATON
No. 62957
CIVIL
STATE OF CALIFORNIA

01/07/2016

carollo

2700 YGNACIO VALLEY ROAD, SUITE 300 • WALNUT CREEK, CALIFORNIA 94598 • P. 925.932.1710 • F. 925.930.0208

Marin Municipal Water District/Central Marin Sanitation Agency

Recycled Water Feasibility Study

TABLE OF CONTENTS

Page No.

LIST OF APPENDICES

LIST OF TABLES

LIST OF FIGURES

ACRONYM LIST

ABAG	Association of Bay Area Governments
ADA	Average Day Annual
ADW	Average Dry Weather
AF	Acre-Feet
AFY	Acre-Feet Per Year
BAF	Biologically Activated Filters
Basin Plan	*Water Quality Control Plan for the San Francisco Bay Basin*
BNR	Biological Nutrient Removal
BTTP	Bon Tempe Treatment Plant
CAS	Conventional Activated Sludge
CBW	Continuous Backwash
CDCR	California Department of Corrections and Rehabilitation
CDPH	California Department of Public Health
CECs	Contaminants of Emerging Concern
CIMIS	California Irrigation Management Information System
CMSA	Central Marin Sanitation Agency
DDW	Division of Drinking Water
DPR	Direct Potable Reuse
DWR	Department of Water Resources
EC	Electrical Conductance
EEQ	Estradiol Equivalency
ET	Evapotranspiration
FAT	Full Advanced Treatment
FOG	Fats, Oils, and Grease
GO	General Obligation
gpcd	Gallons Per Day Per Capita
gpd/sf	Gallons Per Day Per Square Foot
HOAs	Home Owner Associations
HP	Horsepower
IPR	Indirect Potable Reuse
IWRM	Integrated Water Resources Management
JPA	Joint Powers Agency
MBR	Membrane Bioreactor
MDD	Max Day Demand
MF	Microfiltration
MG	Million Gallons
mg/L	Milligrams Per Liter
mgd	Million Gallons Per Day
MMD	Max Month Demand
MMWD	Marin Municipal Water District

MPN	Most Probable Number
MSS	Marin Sanitary Service's
NDMA	N-nitrosodimethylamine
NPDES	National Pollutant Discharge Elimination System Permit
NTU	Nephelometric Turbidity Units
NWRI	National Water Research Institute
O&M	Operation and Maintenance
Panel	Science Advisory Panel
PHD	Peak Hour Demand
PHWW	Peak Hour Wet Weather
R&R	Repair and Replacement
RO	Reverse Osmosis
RVSD	Ross Valley Sanitation District
RW Policy	Recycled Water Policy
RW	Recycled Water
RWFS	Recycled Water Feasibility Study
RWQCB	Regional Water Quality Control Board
SCWA	Sonoma County Water Agency
SGTP	San Geronimo Treatment Plant
SNMP	Salt and Nutrient Management Plan
SQP	San Quentin Prison
SRF	State Revolving Fund
SWRCB	State Water Resources Control Board
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
TOrCs	Trace Organic Constituents
TSS	Total Suspended Solids
UV	Ultraviolet
µg/L	Micrograms Per Liter
WDR	Waste Discharge Requirement
WWTP	Wastewater Treatment Plant

EXECUTIVE SUMMARY

ES.1 INTRODUCTION AND BACKGROUND

The purpose of this study is to determine the feasibility of developing a recycled water system to augment water supplies for Marin Municipal Water District (MMWD). The development of recycled water service within the Central Marin Sanitation Agency (CMSA) service area would offset potable water use and promote the beneficial use of recycled water. Financial support for the Feasibility Study was provided from the State Water Resources Control Board Water Recycling Planning Grant Program, MMWD, and CMSA.

The CMSA wastewater treatment plant has an average dry weather permit capacity of 10 million gallons per day and was recently expanded to treat up to 125 million gallons per day during peak wet weather. The current average daily flow rate is approximately 7.9 million gallons per day.

MMWD's existing water supplies come from a combination of local surface water (approximately 20,000 acre-feet per year), imported water (approximately 7,500 acre-feet per year) from Sonoma County Water Agency, and recycled water (approximately 650 acre-feet per year). The projected per capita water use is approximately 129 gallons per day per capita in 2015, reducing to 119 gallons per day per capita by 2035 due to MMWD's continued conservation efforts.

The CMSA wastewater treatment plant currently produces Disinfected Secondary-23 recycled water to send to Remillard Park Pond to provide habitat for an endangered species of turtle. In a 1988 agreement between CMSA and the City of Larkspur, CMSA agreed to provide recycled water as needed for maintaining the water level in Remillard Park Pond. Recycled water is provided during the dry season when requested by the City of Larkspur due to a low water level in the pond. Typically, Remillard Park pond requests water for two to four weeks during the summer months. Water deliveries range from 216,000 gallons per day to 400,000 gallons per day. CMSA also recently received approval from the State for a recycled water truck filling station for licensed commercial haulers using recycled water in MMWDs service area. The filling station is planned to be operational by the end of 2015.

ES.2 PROJECT ALTERNATIVES

The recycled water uses considered in this study include irrigation, commercial reuse, dual-plumbing at San Quentin Prison, and direct potable reuse. Irrigation, commercial, and dual plumbing uses would require the addition of filtration and disinfection to meet California Title 22 unrestricted reuse standards. Direct potable reuse would require advanced treatment facilities, including ozone, biologically aerated filtration, membrane filtration to remove any bacteria or small particles, followed by reverse osmosis, which removes salts, viruses and contaminates. Then the water would be further treated with advanced oxidation, which would provide another barrier for virus kill as well as destruction of trace organic compounds, resulting in a water that would meet or exceed all drinking water standards. This purified water would be blended with existing water supplies for distribution.

Once the potential recycled water customers were identified, the recycled water demand was estimated and/or confirmed for each type of use. The quantity of water that could be made available for direct potable reuse was estimated based on the supply available from the wastewater treatment plant and also the amount the MMWD system could accept in this area, with the lesser of the two dictating the planning/design flows.

The potential recycled water demands for the customer sites identified are summarized in Table ES1 by type of use.

Table ES1 Initial Recycled Water Market Identification for Urban Uses
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Use Type	Number of Sites	Total Estimated Annual Demand (acre-feet per year)
Landscape Irrigation	168	404.9
Commercial Uses	25	44.7
San Quentin Prison	4	152.5
Total	**197**	**602.1**

The broad categories of customers, as shown in Table ES1, were subdivided into six sub-groups representing 6 geographical regions throughout the CMSA service area. These sub-groups were developed in order to help organize the service area into practical distinct regions that could be served recycled water independently. Each region was identified because it contained either one “anchor” customer (a relatively high single demand) or because it consisted of several densely spaced demands which, when aggregated together, could create a cost effective recycled water alternative. Approximately 75 percent of the identified urban use customers fell within these six sub-groups. The remaining users were determined too small to be served cost effectively with recycled water.

Table ES2 summarizes the identified irrigation and commercial recycled water demands for each of the six sub-groups, while Figure ES1 illustrates their proposed locations.

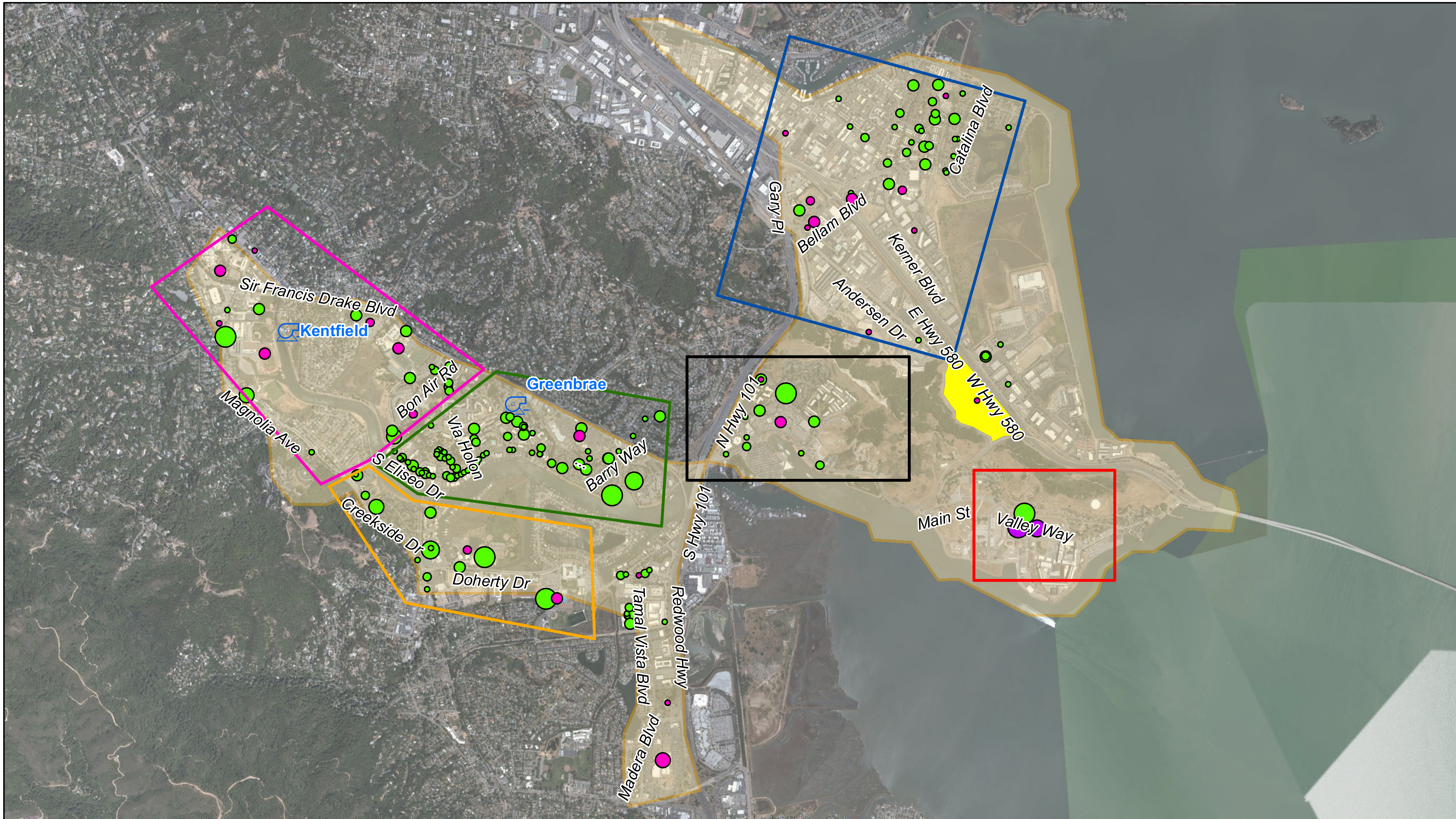
Table ES2 Total Potential Urban Reuse Customer Demands by Sub-group Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District			
Sub-Group	**Number of Customers**	**Average Annual Recycled Water Demand, (acre-feet per year)**	**Total Annual Potential Recycled Water Use (million gallons per day)**
1 - CMSA North	27	44	0.04
2 - San Quentin Prison (SQP)	4(1)	154	0.14
3 - Marin Country Mart	11	34	0.03
4 - Greenbrae	68	106	0.09
5 - Kentfield	23	81	0.07
6 - Doherty Drive	14	113	0.01
Total	**147(2)**	**532**	**0.47**

Notes:
(1) Includes boiler use, dual plumbing, landscape irrigation, and on-site car wash. Landscape irrigation would require additional treatment for salts removal.
(2) The two Operation and Maintenance users included in both CMSA North and SQP are only counted once in the total.

Four conceptual alternatives were developed out of the sub-groups. Within each of these conceptual alternatives, up to 5 sub-alternatives were assessed to select the preferred alternatives to be further evaluated. A total of 17 sub-alternatives were considered and reviewed. The conceptual alternatives can generally be described as the following:

- Reuse at San Quentin – using recycled water delivered from CMSA for four uses at San Quentin Prison: dual plumbing, boiler make-up water, onsite car washing, and landscape irrigation.
- Urban Reuse from Centralized Treatment – using recycled water delivered from CMSA for landscape irrigation and commercial use to offset potable water use.
- Urban Reuse from Satellite Treatment – pulling wastewater from a collection system pump station and treating it through a satellite treatment facility for urban reuse close to the point of treatment.
- Direct Potable Reuse – providing potable water offset using advance treatment technologies and detention of the purified water prior to blending into the MMWD water distribution system.

After the initial evaluation of the 17 sub-alternatives on the basis of costs and implementation, the resulting preferred alternatives were developed and are summarized in Table ES3. Table ES4 provides the economic comparison of the preferred alternatives.



Commercial Demands	Irrigation Demands	Customer Sub-Groups	Other Demands	
0.0 - 1.0 AFY	0.0 - 1.0 AFY	CMSA NORTH	0.0 - 1.0 AFY	Pump Stations
1.1 - 2.0 AFY	1.1 - 2.0 AFY	GREENBRAE	1.1 - 2.0 AFY	WWTP
2.1 - 5.0 AFY	2.1 - 5.0 AFY	KENTFIELD	2.1 - 5.0 AFY	Study Area Boundary
5.1 - 7.0 AFY	5.1 - 7.0 AFY	DOHERTY DRIVE	5.1 - 7.0 AFY	
7.1 - 15.0 AFY	7.1 - 15.0 AFY	MARIN COUNTY MART	7.1 - 15.0 AFY	
15.1 - 172.0 AFY	15.1 - 172.0 AFY	SAN QUENTIN	15.1 - 172.0 AFY	

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N

0 1,000 2,000 4,000 Feet

POTENTIAL RECYCLED WATER CUSTOMER SUB-GROUPS

FIGURE ES.1

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Table ES3 Summary of Preferred Alternatives – Basis of Alternatives Comparison
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt Name	Demand/Capacity: Recycled Water Delivered, (acre-feet per year)	Demand/Capacity: Treatment/ Distribution System Capacity, (million gallons per day)
1A	SQP - Conventional	154	0.20
1B	SQP - Microfiltration	154	0.20
1C	SQP - Microfiltration/Reverse Osmosis	154	0.20
3D	Kentfield Select	42	0.12
3E	Greenbrae Select	49	0.14
4B	Direct Potable Reuse	2,260	2

Table ES4 Economic Comparison of Preferred Alternatives[1,2]
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt. Name	Capital Cost, $Millions	Project Cost, $Millions[3]	Annual Cost, $Millions/ year[4]	Unit Cost per Acre-Foot of Net Potable Offset
1A	SQP - Conventional	$5,270,000	$6,590,000	$381,000	$2,490
1B	SQP - Microfiltration	$6,820,000	$8,530,000[5]	$447,000	$2,920[5]
1C	SQP - Microfiltration/ Reverse Osmosis	$8,250,000	$10,310,000	$529,000	$3,440
3D	Kentfield Select	$4,250,000	$5,310,000	$297,000	$7,130
3E	Greenbrae Select	$5,490,000	$6,860,000	$367,000	$7,570
4B	Direct Potable Reuse - 2	$33,350,000	$43,360,000	$2,874,000	$1,270

Notes:
(1) Based on Engineering News Record Construction Cost Index - San Francisco of 11,155 (July 2015).
(2) The costs presented above are for new facilities to meet the demands listed.
(3) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(4) Includes Operations & Maintenance Costs and annualized project cost (discounted at 1% over a 30-year period).
(5) If instead of chlorine disinfection UV disinfection is used the Project Cost is $8.75 million and the unit cost per acre-foot is $3,000.

The preferred alternatives can generally be described as follows:

- 1A: This alternative includes treatment of recycled water with conventional filtration and chlorine disinfection. Recycled water in this alternative would be used onsite at CMSA's new truck filling station and also at SQP for dual plumbing, boiler, irrigation, and car washing uses.

- 1B: This alternative includes treatment of recycled water with microfiltration and chlorine disinfection. Microfiltration is used to allow for the easy addition of reverse osmosis if desired at a future time. Recycled water in this alternative would be used onsite at CMSA's new truck filling station and also at SQP for dual plumbing, boiler, irrigation, and car washing uses.

- 1C: This alternative includes treatment of recycled water with microfiltration/reverse osmosis and UV light disinfection. The reverse osmosis process would help reduce the salt levels in the recycled water. Recycled water in this alternative would be used onsite at CMSA's new truck filling station, onsite for Marin Sanitary Service needs, and also at SQP for dual plumbing, boiler, irrigation, and car washing uses.

- 3D: This satellite treatment alternative would use a package plant to treat sewage at the Kentfield pump station. Treatment would include membrane bioreactors and UV light disinfection. A small number of recycled water users located right around the Kentifeld pump station would be supplied with this alternative.

- 3E: This satellite treatment alternative would use a package plant to treat sewage at the Greenbrae pump station. Treatment would include membrane bioreactors and UV light disinfection. A small number of recycled water users located right around the Greenbrae pump station would be supplied with this alternative.

- 4B: This alternative includes full advanced treatment at CMSA to produce two million gallons per day of potable quality recycled water. This recycled water would be fed directly into MMWD's distribution system for potable reuse.

Screening of the preferred alternatives was conducted based on defined criteria and assigned a value on a scale of 1 to 10, with 10 being the ‘best’ fit relative to the criteria and 1 being the ‘worst’. The summation of the criteria values for each alternative provided an overall score and a ranking used to identify the recommended project. Table ES5 summarizes the screening scores and overall project rankings.

Table ES5 Screening of Preferred Alternatives[1]
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

	Economic			Implementation Considerations							
Alt	**Cost[2]**	**Cost Sharing**	**Energy Use**	**Regulatory Acceptance**	**Potable Offset**	**Public Acceptance**	**Ability to Phase**	**Constructability**	**Ease to Implement**	**Admin Ease**	**Total Score**
1A – SQP - Conventional	8	8	7	9	8	8	1	9	8	9	**75**
1B – SQP - Microfiltration	7	8	7	9	8	8	8	8	7	9	**80**
1C - SQP - Microfiltration/ Reverse Osmosis	6	8	5	9	8	8	9	7	7	9	**76**
3D – Kentfield Select	1	2	6	7	3	6	1	4	6	8	**44**
3E – Greenbrae Select	1	2	6	7	3	6	1	4	6	7	**43**
4B – Direct Potable Reuse -2	10	8	2	6	10	5	9	4	1	9	**64**

Notes:
(1) Scoring from 1 to 10 with 10 being the ‘best’.
(2) This was screened based on the unit cost of the alternatives ($ per acre-foot) rather than the total annual cost.

ES.3 RECOMMENDED PROJECT

Based upon the screening and ranking of the preferred alternatives, the recommended project for the CMSA/MMWD Recycled Water Feasibility Study is Alternative 1B – San Quentin Prison with microfiltration treatment. The recommended project was estimated to be the most cost effective approach for adding recycled water use within the CMSA service area at this time. The use of microfiltration, instead of conventional filtration, would allow for the easy addition of reverse osmosis in the future if MMWD or CMSA wishes to expand the program into irrigation at other identified sites that need a higher quality water (less salts).

This alternative is planned to provide recycled water to uses at San Quentin Prison. The project would include the addition of microfiltration and the modification of the existing chlorine contact tanks for recycled water disinfection at the CMSA wastewater treatment plant. A new recycled water pump station and operational storage tank located at the CMSA wastewater treatment plant as well as piping to San Quentin Prison is also included with this project. A retrofit of the existing partially dual plumbed facilities at San Quentin's North, East, South, and West Blocks makes up the another component of this project. At this point in time, it is assumed that San Quentin will provide any additional salinity reduction treatment required onsite for recycled water use for their irrigation, boiler, and car washing needs. Regular inspection and cross connection testing, generally annually, is required for recycled water dual plumbed systems. This inspection is conducted on a regular prescribed basis and includes inspection of each recycled water and potable water connection inlet and outlet.

This recommended project also includes providing recycled water to the commercial truck filling station recently constructed at CMSA. However, because salinity reduction will not be provided at CMSA with this recommended project, the second identified operations & maintenance use, namely Marin Sanitary Service, is not included in this project. Based on previous experience taking high salinity water, Marin Sanitary Service has indicated that they are only interested in low salinity water to protect their trucks from corrosion.

The potential recycled water customers and pipeline alignment included in the recommended project are presented in Figure ES2. Table ES6 includes a summary of the customers included in the recommended project along with their average annual demands. The recommended project planning level costs are presented in Table ES7.

Potential funding opportunities and financing mechanisms for capital and operations costs, including an outline of current applicable grants and loan opportunities, were identified for this study. Cost sharing concepts and strategies between CMSA, MMWD, and San Quentin Prison/California Department of Corrections and Rehabilitation for the construction, operation, maintenance, ownership, and permitting of the new tertiary reuse system should be discussed and would be necessary to move this project forward.

Legend

- Dual Plumbing and Boiler Piping
- CMSA
- San Quentin Prison

N

Feet

0 300 600 1,200

RECOMMENDED PROJECT
PROPOSED PIPELINE ROUTING

FIGURE ES.2

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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Table ES6 Customers Included in the Recommended Project Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District	
Customers	**Average Annual Demand, (Acre-feet per year)**
San Quentin Uses	
Landscape Irrigation(1)	16.4
Boiler Make-up Water	14.3
Dual Plumbing in North, South, East, and West Blocks	121.7
Car Wash(1)	0.1
Other Uses at CMSA	
CMSA Truck filling station	**0.5**
Total Recycled Water Use	**153**

Note:
(1) Due to the current drought SQP is currently not irrigation or using water to wash cars.

Table ES7 Recommended Project Cost Estimate(1) Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District	
Description	**Recommended Project Cost**
Treatment	$3,154,000
Pump Station	$721,000
Pipeline to the Prison	$1,140,000
Dual Plumbing	$1,666,000
Storage	$106,000
Connection Fees/Retrofit(2)	$35,000
Total Capital Cost, $	**$6,820,000**
Project Cost Soft Costs(3)	$1,710,000
Total Project Cost, $	**$8,530,000**
Annualized Project Cost, $/year(4)	$330,000
O&M Cost, $/year(5)	$117,000
Total Annual Cost, $/year	**$447,000**
Volume Water Delivered (Acre -feet/year)	153
Unit Cost per acre-foot	$2,920

Notes:
(1) ENRCCI _SF = 11,155 (July 2015).
(2) Based on conversion of commercial customers only (at a direct cost of $20,000 per customer) plus incidental amount for irrigation customers (at a direct cost of $5,000 per customer). The cost shown above includes the standard markup. Both a commercial and irrigation connection fee were assumed for connecting to the prison's irrigation and boiler/car washing system, respectively.
(3) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(4) Discounted at 1% over a 30-year period.
(5) Includes annual costs for energy, chemical use, equipment maintenance, and labor.

STUDY AREA CHARACTERISTICS

1.1 INTRODUCTION

The Central Marin Sanitation Agency (CMSA) and Marin Municipal Water District (MMWD) contracted with Carollo Engineers to provide engineering services for a Recycled Water Feasibility Study. The purpose of this study is to determine the feasibility of constructing a new recycled water system to replace/augment existing irrigation supplies for MMWD. The development of recycled water service within the CMSA service area would offset potable water use and promote the beneficial use of recycled water for irrigation, cooling tower use, and/or use at San Quentin prison.

CMSA is a Joint Powers Agency (JPA) formed in 1979 to consolidate the wastewater collection, treatment, water reclamation and disposal needs of about 110,000 residents in Central Marin County as well as San Quentin State Prison. CMSA was originally comprised of four Member Agencies: San Rafael Sanitation District, Sanitary District No. 1, Sanitary District No. 2, and the City of Larkspur. In 1993 Larkspur annexed into Ross Valley Sanitary District. Each member agency owns, operates, and maintains their respective sanitary sewer collection system.

The service area being investigated in this study is the area served by the member agencies that comprise the CMSA JPA, as shown in Figure 1.1.

This report follows the State Water Resources Control Board (SWRCB) Water Recycling Program Funding Guidelines, “Recommended Planning Outline for Water Recycling Projects”, which can be found at http://www.waterboards.ca.gov. A copy of these guidelines can be found in Appendix A of this report. Development of this report was funded by a SWRCB Water Recycling Planning grant, CMSA, and MMWD.

1.2 HYDROLOGIC FEATURES

CMSA and its member agencies are predominantly located within the Ross Valley and San Rafael Watersheds. The drainage area of these two watersheds is approximately 39 square miles, with elevations ranging from 1,591 feet to sea level at San Pablo Bay.

The headwaters of the Ross Valley watershed lie in steep, V-shaped canyons with gently sloping terrain in the valley regions. All the land along Corte Madera Creek and its tributaries is urbanized, with residential and commercial buildings, roads and other development. The mouth of the creek lies south of Sir Francis Drake Boulevard where the

Legend

- Highways
- CMSA Boundary
- City Limits
- County Boundary
- Water Body

N

0 4 8 Miles

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GENERAL VACINITY MAP

FIGURE 1.1

CENTRAL MARIN SANITARY DISTRICT

MARIN MUNICIPAL WATER DISTRICT

RECYCLED WATER FEASIBILITY STUDY

channel feeds into a coastal brackish marsh. The headwaters of the San Rafael watershed originate in the hills above Tamalpais Cemetery. From there, the San Rafael Creek flows down through densely urbanized areas and filled wetlands into the San Rafael Canal, near Highway 101. Figure 1.2 illustrates the topographic and hydrologic features of the study area.

1.2.1 Groundwater Basin

The CMSA service area sits within the Ross Valley and San Rafael Groundwater Basins but groundwater in the area is very limited due to the geologic formations present. What groundwater does exist and is accessible is already being utilized for landscape irrigation purposes by public and private parties.

1.3 LAND USE AND POPULATION

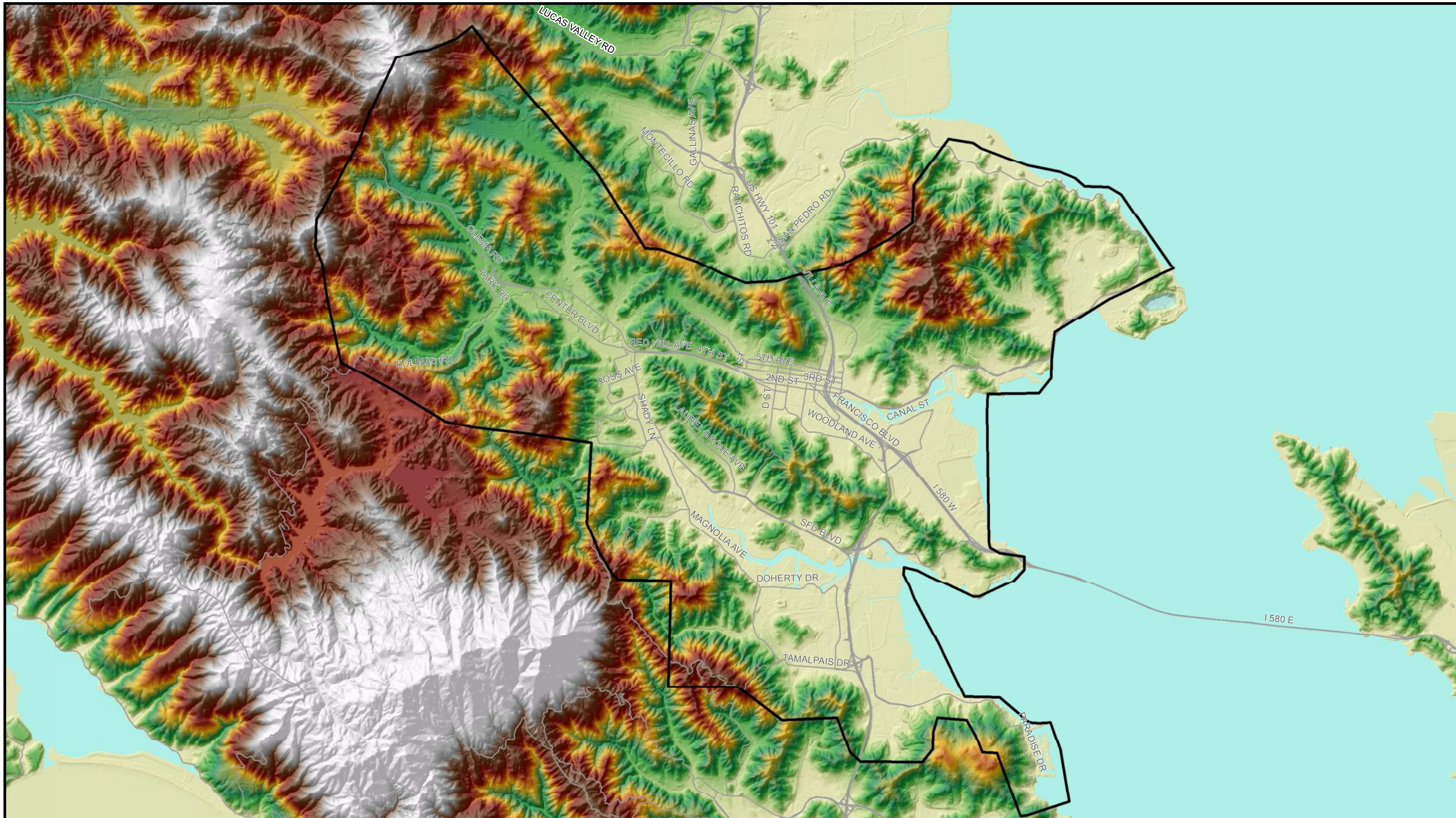
The CMSA communities maintain a small town character and strong connection to their natural location. As such, land use within CMSA's service area is predominantly single family residential. Within the service area, there are several main commercial districts: Downtown San Rafael Village, Corte Madera Town Center, Marin Square Shopping Center along Andersen Drive, and Marin Country Mart. The land use is not expected to shift significantly in the future. Figure 1.3 shows future general plan land use for the CMSA service area.

The population of CMSA's service area in 2014 was 110,000 according to MMWD's 2010 Urban Watershed Management Plan, the population of MMWD is projected to grow by 0.33 percent over the next two decades (2015-2035). These estimates are based on Association of Bay Area Governments (ABAG) projections.

Given a growth rate of 0.33 percent, the 2035 population of the CMSA service area is projected to increase to approximately 117,880.

1.4 BENEFICIAL USES AND WATER QUALITY

The CMSA wastewater treatment plant (WWTP) discharges to Central San Francisco Bay. As a discharger to the Bay, CMSA must consider the *Water Quality Control Plan for the San Francisco Bay Basin* (Basin Plan). The Basin Plan provides water quality control planning, designates beneficial water uses, and sets water quality objectives for the Bay. Table 1.1 shows the beneficial uses for the Central San Francisco Bay as listed in the Basin Plan.



Legend

Major Roads

CMSA Boundary

Water Bodies

Elevation

High : 2577.17

Low : Sea Level

Feet

0 5,000 10,000

TOPOLOGICAL AND HYDROLOGICAL FEATURES OF THE STUDY AREA

FIGURE 1.2

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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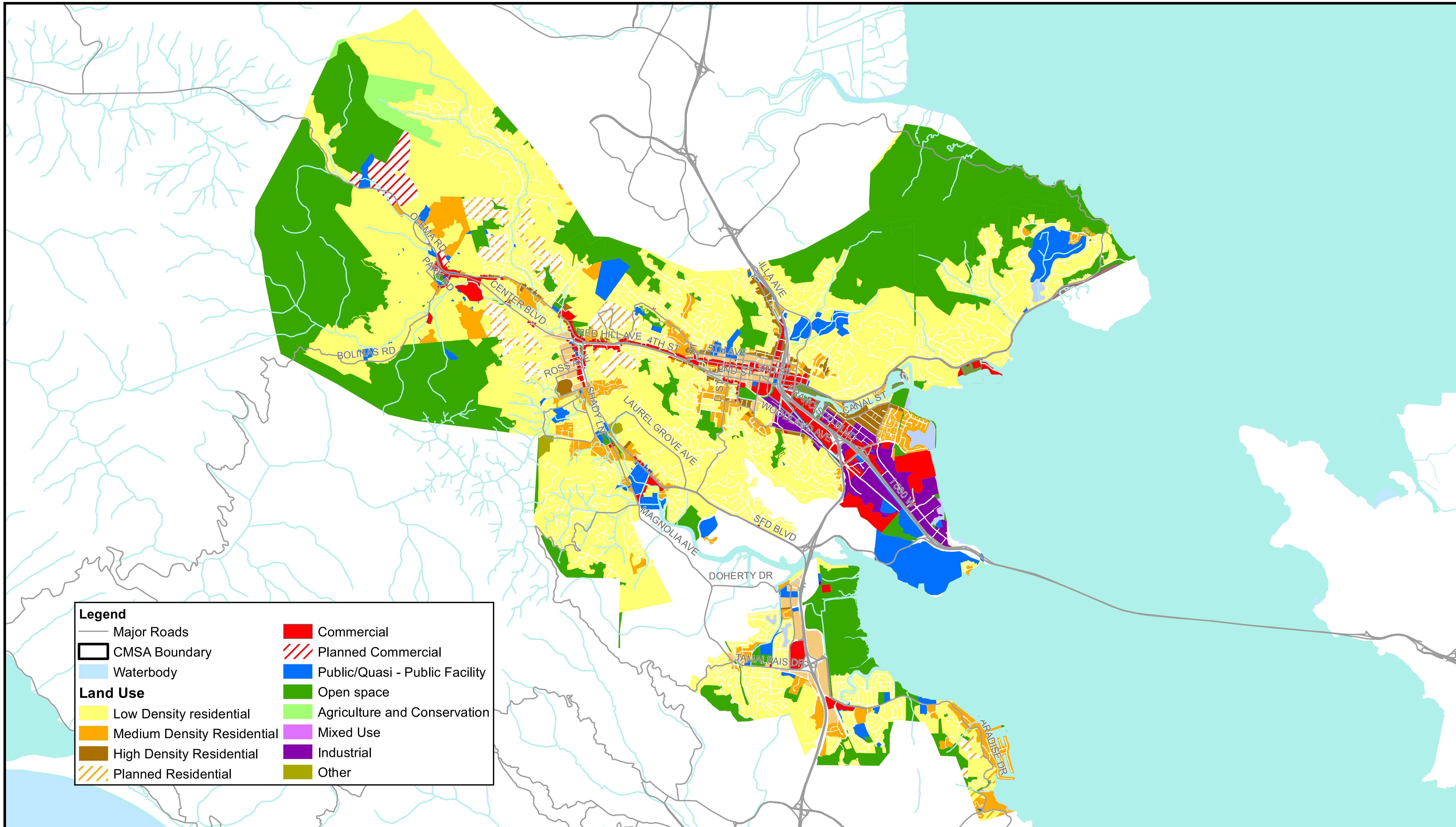
F:\KRC D DRIVE\Marin County\Figure 2 - Topo.mxd



GENERAL PLAN LAND USE IN CMSA'S SERVICE AREA

0 4,800 9,600 Feet

FIGURE 1.3

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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F:\KRC D DRIVE\Marin County\Figure 3 - LU.mxd

Table 1.1 Beneficial Uses of the Central San Francisco Bay
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Receiving Water	Beneficial Uses
Central San Francisco Bay	Industrial Service Supply
	Industrial Process Supply
	Commercial and Sport Fishing
	Shellfish Harvesting
	Estuarine Habitat
	Fish Migration
	Preservation of Rare and Endangered Species
	Fish Spawning
	Wildlife Habitat
	Water Contact Recreation
	Non-Contact Water Recreation
	Navigation

Chapter 2

WATER SUPPLY CHARACTERISTICS AND FACILITIES

This chapter summarizes the water supply quality and quantity, both now and in the future, available to the CMSA service area. The chapter also summarizes the existing facilities used for drinking water treatment.

2.1 WATER SOURCES

MMWD is a water retailer providing drinking water to the populous eastern corridor of Marin County, including the CMSA service area. MMWD covers approximately 147 square miles and serves a population of approximately 190,000 through about 61,000 active service connections. Figure 2.1 shows the MMWD service area.

MMWD's water supplies come from a combination of local surface water, imported water from Sonoma County Water Agency (SCWA) and recycled water. Table 2.1 provides a summary of current and projected water supplies. Details of each water supply are described further herein:

- **Local Surface Water** – Rainfall is collected from the MMWD watershed into 7 reservoirs for a total of 25.9 billion gallons (79,566 acre-feet per year [AFY]) of surface water storage.
- **Imported Water** – Through agreements with SCWA, MMWD has contractual rights to deliveries of up to 14,300 AFY from Lake Sonoma via the Russian River.
- **Recycled Water** – About 650 AFY of recycled water is produced to offset potable drinking water use. This recycled water comes from two WWTPs within the MMWD service area: Sewer Agency of Southern Marin/Richardson Bay Sanitary District tertiary facilities and the Las Gallinas Recycling Plant.

Table 2.1 Current and Projected MMWD Water Supplies (AFY)(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Water Supply Sources	2010	2015	2020	2025	2030	2035
Supplier-Produced Surface Water	19,077	20,000	20,000	20,000	20,000	20,000
SCWA	6,521	8,500	8,500	8,500	8,500	8,500
Recycled Water	514	534	763	765	766	768
Total	**26,112**	**29,034**	**29,263**	**29,265**	**29,266**	**29,268**

Note:
(1) Adapted from Table 4-1, MMWD's 2010 Urban Water Management Plan (MMWD, 2011).

MMWD SERVICE AREA

FIGURE 2.1

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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2.2 HISTORICAL AND PROJECTED WATER USE TRENDS

The historic and future drinking water demands for MMWD's system are presented in this section. The CMSA service area encompasses only a portion of MMWD's service area, and CMSA specific water demands are not easily extractable from MMWD's current data. Therefore, water use trends from the entire MMWD service area are used as representative of water use within the CMSA service area.

2.2.1 Historical Water Use

Past and current water uses were quantified and distributed between water use sectors and are presented in Table 2.2.

Table 2.2 Historic Water Deliveries for MMWD
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Water Use Sector	2005		2010	
	# of Accounts	Volume (AFY)	# of Accounts	Volume (AFY)
Single Family	50,817	15,027	50,639	13,501
Multi-Family	4,522	3,630	4,509	3,404
Commercial	3,372	3,061	3,335	2,721
Institutional/ Government	244	1,726	244	1,641
Landscape	1,032	1,319	1,012	1,205
Total	**59,987**	**24,763**	**59,739**	**22,471**

Note:
(1) Adapted from Tables 3.5 and 3.6 in the 2010 UWMP (MMWD, 2011).

2.2.2 Projected Water Use Trend

Water demand projections were developed using MMWD's Demand Management Least Cost Planning Decision Support System and adjusted to include water savings through continued implementation of MMWD's *2007 Water Conservation Master Plan*. The demand projections also include water savings resulting from new development ordinances, plumbing codes and the Cal Green building code which requires new installations of water efficient fixtures or the replacement of old fixtures.

The projected per capita water use is approximately 129 gallons per day per capita (gpcd) in 2015, reducing to 119 gpcd by 2035 due to MMWD's continued conservation efforts. The 'unaccounted for' water loss was estimated to be approximately 9 percent based on historical trend and the current leak detection and repair program. Table 2.3 summarizes MMWD's projected water use through 2035.

Table 2.3	Projected Water Deliveries (AFY) for MMWD Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Water Use Sectors	**2015**	**2020**	**2025**	**2030**	**2035**
Single Family	15,478	15,332	15,300	15,382	14,441
Multi-Family	3,615	3,553	3,507	3,493	3,481
Commercial	2,894	2,770	2,721	2,717	2,714
Institutional/ Government	1,683	1,693	1,711	1,733	1,752
Landscape	1,301	1,052	1,066	1,081	1,097
Subtotal	**24,971**	**24,401**	**24,304**	**24,406**	**24,486**
Additional Water Uses/Losses(2)	3,697	3,911	3,897	3,894	3,895
Total Water Use	**28,668**	**28,312**	**28,201**	**28,301**	**28,381**

Notes:
(1) Adapted from Tables 3.7 to 3.9 in the 2010 UWMP (MMWD, 2011).
(2) Adapted from Table 3.11 in the 2010 UWMP (MMWD, 2011).

2.3 QUALITY OF WATER SUPPLIES

MMWD's drinking water quality has never exceeded a water quality regulatory limit or received a regulatory violation. Five of seven local surface water reservoirs are located in MMWD-owned and protected watersheds, substantially reducing the potential for contamination. The two unprotected reservoirs are in rural areas with low population densities that have strict zoning requirements in place and have established Watershed Protection Agreements with landowners within the watershed. Accordingly, high water quality is expected to continue into the future.

The largest impact to water quality in MMWD's surface water reservoir is algal blooms that can create taste and odor problems. This is purely an aesthetic issue as there are no health concerns with taste and odor compounds. MMWD manages algal blooms through lake monitoring and careful application of copper sulfate when necessary.

2.4 WATER FACILITIES

As noted, MMWD supplies potable water from a combination of two sources: local surface water and imported groundwater from SCWA via Ranney collectors at the Russian River. MMWD's local surface water facilities include seven (7) raw water reservoirs, two (2) drinking water treatment plants and one (1) water quality and pumping station at the SCWA turnout. In addition, MMWD operates one (1) recycled water facility at the Las Gallinas WWTP.

Table 2.4 summarizes MMWD's reservoir system capacities and Figure 2.2 illustrates the location of the reservoirs throughout MMWD's service area.

Table 2.4 MMWD Surface Reservoir System Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District		
Reservoir Name	**Year Constructed**	**Storage Capacity (AF)**
Lake Lagunitas	1873	350
Phoenix Lake	1905	411
Bon Tempe Reservoir	1948	4,017
Alpine Lake	1918	3,069
	1924	4,600
	1941	8,891
Kent Lake	1953	16,050
	1982	32,895
Nicasio Reservoir	1960	22,430
Soulajule Reservoir	1980	10,572
Total Existing Reservoir Storage		**79,566**

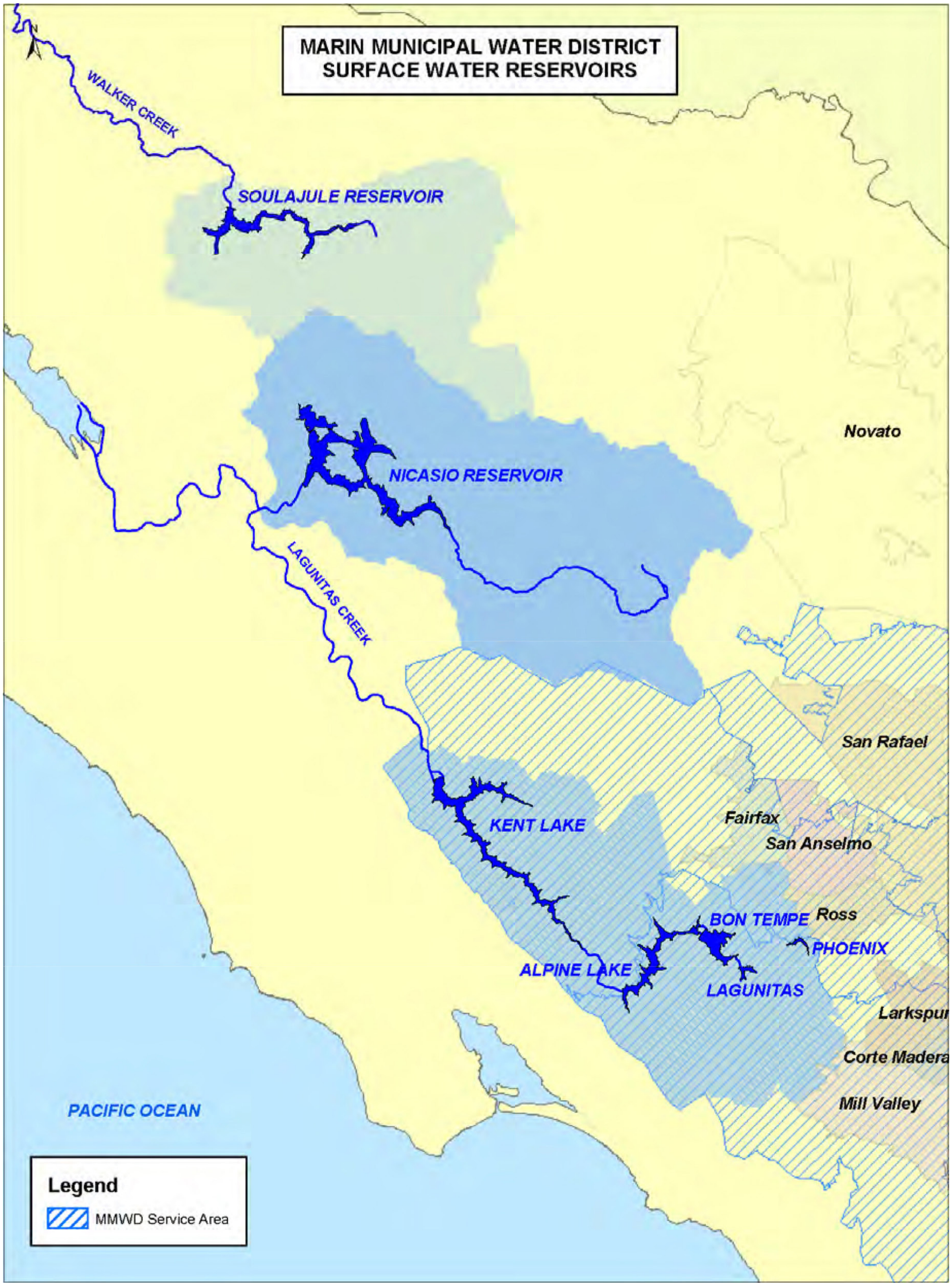
Note:
(1) Adapted from Table 4.2 in the 2010 UWMP (MMWD, 2011).

The annual inflow for MMWD's reservoir system varies greatly from a maximum of 220,000 acre-feet (AF) in 1983 to a minimum of only 4,100 AF in 1977. The average and median annual runoff are 84,800 AF and 72,300 AF, respectively.

MMWD owns and operates two (2) water treatment facilities: Bon Tempe Treatment Plant (BTTP) near Ross and the San Geronimo Treatment Plant (SGTP) in Woodacre. The treatment processes in both plants consists of clarifiers, deep-bed, multi-media filtration and disinfection, corrosion control and fluoride addition. Figure 2.3 illustrates MMWD's water distribution system and the location of the treatment facilities in relation to Kent Lake and Bon Tempe Reservoir.

Table 2.5 summarizes the capacities of the treatment and distribution system facilities.

The water imported from SCWA is naturally filtered in the deep sand and gravel below the river bed and requires no further clarification. The water enters MMWD's system at the Ignacio Water Quality and Pumping Station (shown on Figure 2.3), where water quality is monitored continually. Final treatment is similar to that used at the two reservoir treatment plants.



MMWD'S SURFACE WATER RESERVOIRS

FIGURE 2.2

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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MMWD'S WATER DISTRIBUTION SYSTEM

FIGURE 2.3

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Table 2.5 MMWD Water Treatment and Distribution Facilities Capacity Summary Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District

Facility	Unit	Capacity(1)
Treatment Plant Capacity:		
Average Day	mgd	25
Maximum Day	mgd	59
Number of Storage Tanks		128
Total Storage Tank Capacity	MG	84
Distribution Pipelines	miles	912
Number of Pump Stations		95

Notes:
(1) Capacity information derived from http://www.marinwater.org/DocumentCenter/View/916.

Given MMWD's commitment to water conservation, implementation of its Water Conservation Master Plan and its commitment to complying with the 2009 Water Conservation Bill, water demand is projected to remain at levels that can be met by the current water supply sources through 2035. MMWD is exploring opportunities for recycled water within its service area.

WASTEWATER CHARACTERISTICS AND FACILITIES

This chapter discusses current and future wastewater quality and quantity, as well as the existing facilities used to treat the wastewater to secondary levels of treatment. Also, the existing recycled water agreements currently in affect are summarized herein.

3.1 WASTEWATER ENTITIES AND FACILITIES

CMSA collects raw wastewater from its four (4) member agencies and the California Department of Corrections (San Quentin Prison). CMSA's WWTP is located at 1301 Andersen Drive in San Rafael, California. CMSA was formed in 1979 when four local agencies providing wastewater services entered into a Joint Powers Agreement. CMSA was created to oversee the construction and operation of a regional WWTP, and began operation in 1985.

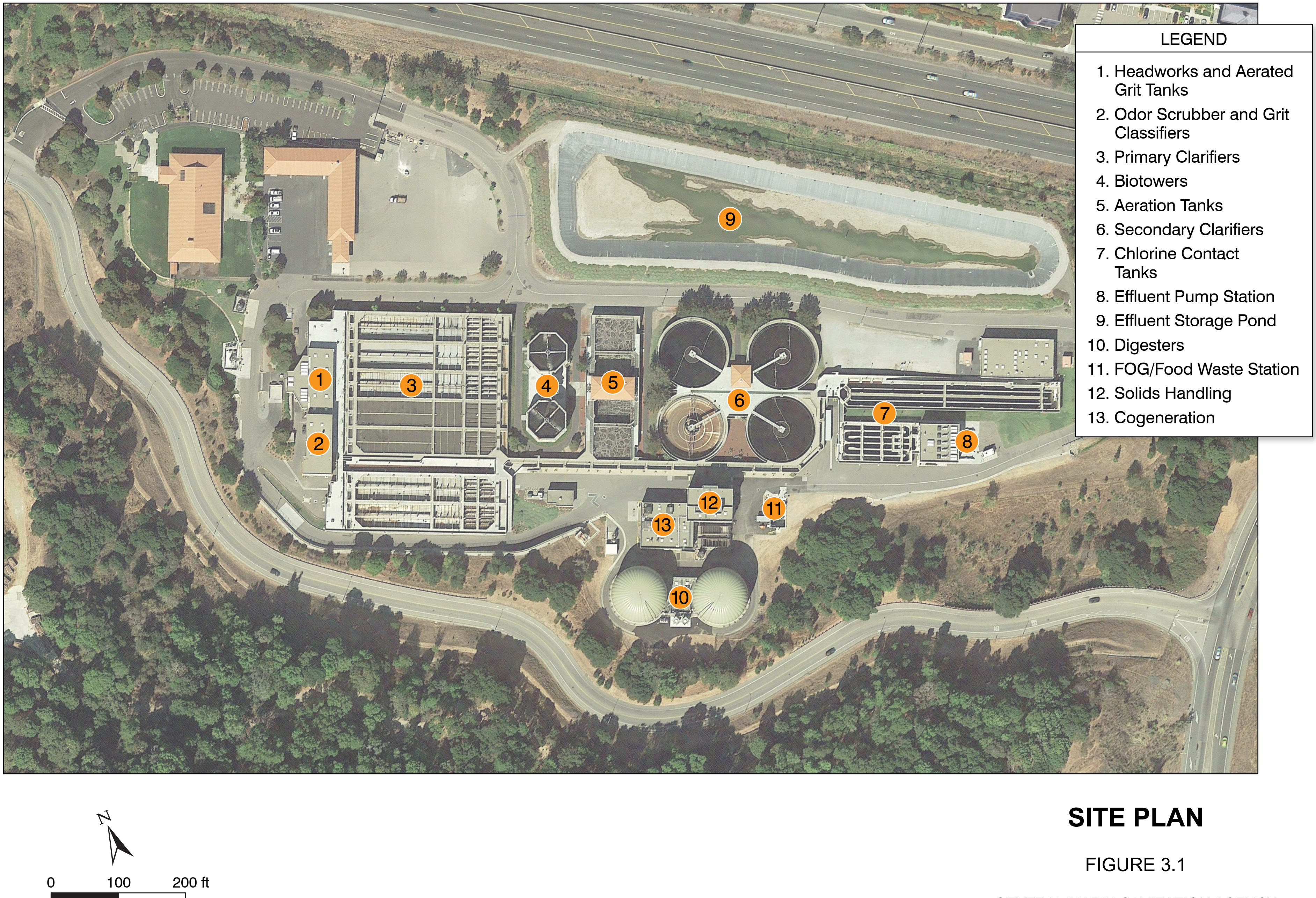
3.1.1 Wastewater Facilities

An overview of the existing treatment facilities layout is provided in Figure 3.1. The WWTP's treatment process consists of screening, grit removal, primary sedimentation, biological treatment (trickling filters), aeration, secondary clarification, disinfection (chlorination), dechlorination, and effluent storage. Treated, disinfected effluent is discharged to Central San Francisco Bay via a submerged outfall approximately 8,000 feet offshore at a depth of about 12 to 28 feet at mean lower low water.

Biosolids removed from the wastewater stream are treated by anaerobic digestion and dewatering by centrifuges. A FOG/Food Waste Facility that accepts fats, oils, and grease (FOG) as well as commercial food waste from private haulers also exists on site. These wastes are added to the digesters along with biosolids from the wastewater stream to produce biogas. The biogas produced is used in their cogeneration facility. A process flow diagram for the liquid and solids streams is shown in Figure 3.2.

3.1.2 Existing Wastewater Flows

The WWTP has an average dry weather (ADW) permit capacity of 10 million gallons per day (mgd) and was recently expanded to treat up to 125 mgd during peak wet weather (i.e., peak hour wet weather [PHWW]). The current average daily flow rate is approximately 7.9 mgd. Table 3.1 shows the most recent historical flows from January 2011 to November 2014 including dry and wet weather flows.



SITE PLAN

FIGURE 3.1

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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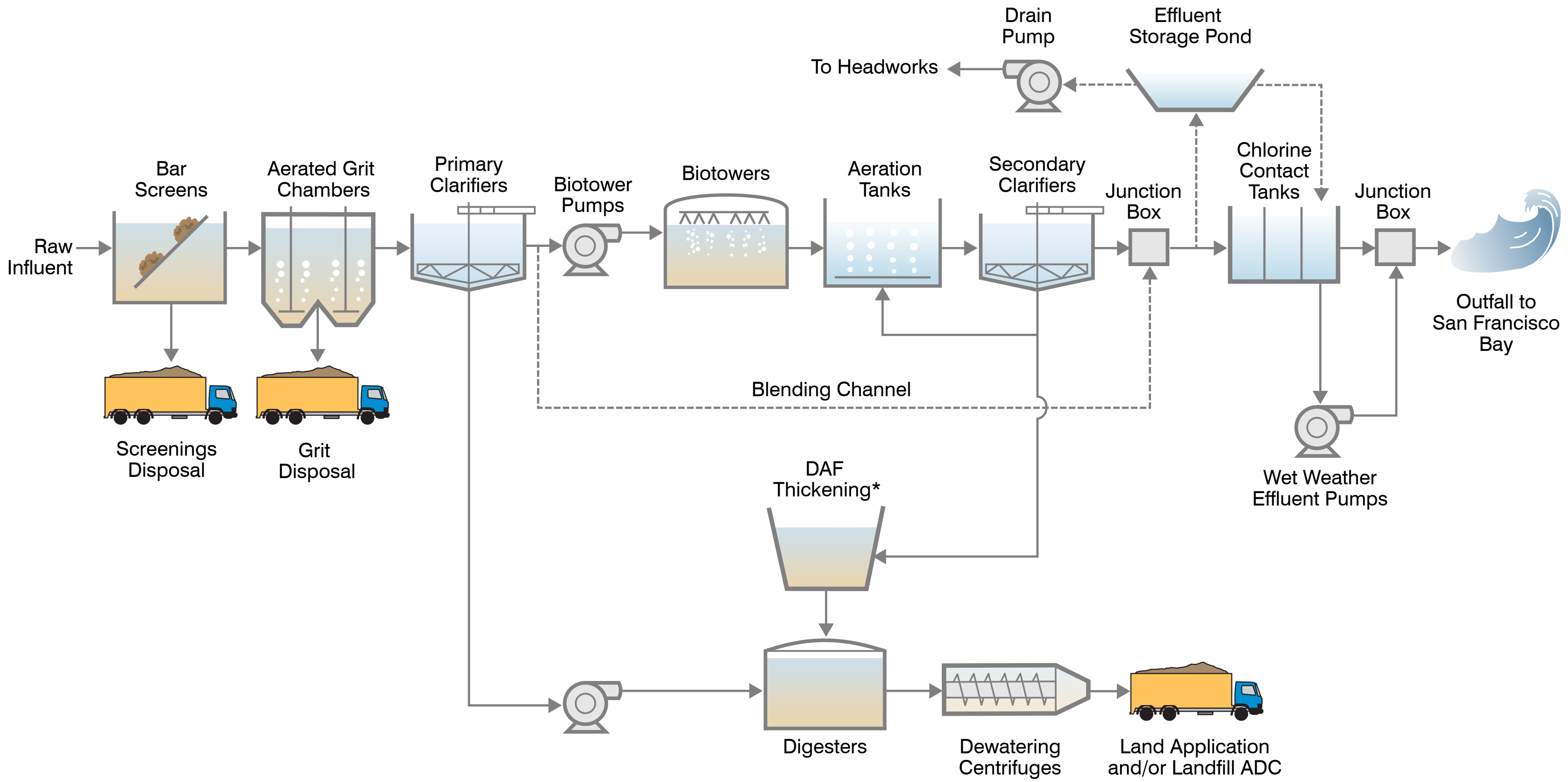

LEGEND
Continuous Operation
Intermittent Operation

NOTE:
* Currently being replaced with rotary drum thickeners.

PROCESS FLOW SCHEMATIC

FIGURE 3.2

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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Table 3.1	Historical WWTP Flows (January 2011 to November 2014) Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Flow, mgd	**2011**	**2012**	**2013**	**2014**	**2011– 2014 Average**
ADW	6.1	5.8	5.6	4.7	5.6
ADA	9.3	9.3	6.3	7.9	8.2
ADMM	22.5	21.1	8.8	21.7	18.5

Notes:
ADW = Average Dry Weather - The average flow occurring during the dry season, defined as the minimum 90-day average flow occurring between the months of May and October.
ADA = Average Day Annual - The average flow occurring over the course of the year.
ADMM = Average Day Max Month - The average daily flow occurring during the maximum flow month of the year. This is calculated as the maximum 30-day average for the year.

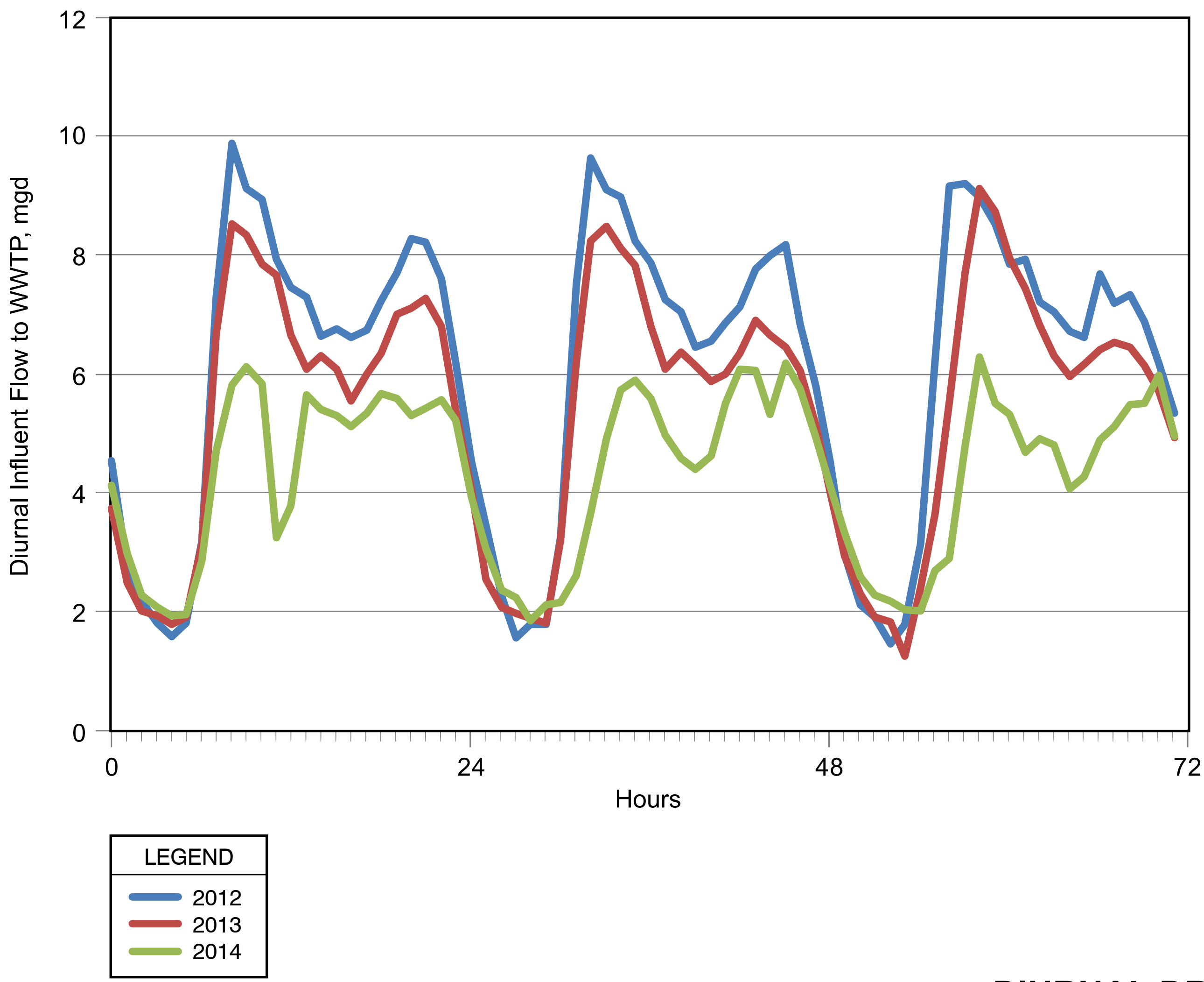
The influent flow rates peak during the mornings (8:00 to 9:00 AM) and evenings (8:00 to 9:00 PM). The minimum influent flow rate occurs between 3:00 and 4:00 AM.

3.1.2.1 Diurnal Flow Patterns

Influent diurnal flow patterns to the WWTP, especially during the irrigation season, are important to understand the quantity of secondary effluent available for a recycled water system. Figure 3.3 shows the diurnal flow pattern over three days in August 2012, 2013, and 2014.

3.1.3 Projected Wastewater Flows

Based on the 2011 to 2014 average ADW flow of 5.9 mgd and a service area population of 110,000, the per capita dry weather flowrate is 45.4 gpdc. Using the ABAG population growth rate of 0.33 percent contained in the MMWD 2010 Urban Watershed Management Plan, the WWTP influent ADW flow is expected to increase from 5.0 mgd in 2014 to 6.32 mgd in 2035. This estimated ADW flow is well below the WWTP's ADW permitted capacity of 10 mgd. Table 3.2 shows a summary of existing and future projected wastewater flows for the WWTP. The relatively unchanged projected growth rate for wastewater flows through 2035 mirrors the projected drinking water demands over the same time period (as discussed in Chapter 2).



DIURNAL DRY WEATHER INFLUENT FLOW TO WWTP

FIGURE 3.3

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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Table 3.2 Summary of Existing and Future Wastewater Flows Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District							
		Existing Conditions(1)			Projected 2035 Values		
Parameter	Units	ADW	ADA	ADMM	ADW	ADA	ADMM
Flow	mgd	5.9	7.9	16.5	6.3(3)	8.4(4)	17.5(4)
Minimum Hour Dry Weather Flow(2,5)		3.3 mgd			3.6 mgd		
Peak Hour Dry Weather Flow(2,5)		14.6 mgd			16.5 mgd		
Peak Hour Wet Weather Flow(2)		98 mgd			98 mgd		

Notes:

(1) Existing flow and loads were based on averages of the 2011, 2012, 2013, and 2014 WWTP data.
(2) Existing minimum and peak hourly dry weather flows were based on average dry weather data for the years 2012, 2013, and 2014. Existing Peak Hour Wet Weather flow was based on flow data from 2014.
(3) Projected ADW flow was based on a per capita flow of 53.6 gpcd and an annual population growth rate of 0.33%.
(4) Projected ADA and ADMM flows were based on average historical peaking factors for 2011, 2012, 2013 and 2014 and the projected ADW projected flow.
(5) Projected minimum and peak hourly dry weather flows were based on average historical peaking factors for 2012, 2013 and 2014 and the projected ADW projected flow.

3.1.4 Wastewater Treatment Capacity

CMSA WWTP has sufficient capacity to meet existing and future WWTP flows and loads during ADW and ADMM flows. A Capital Master Planning Assistance Report was conducted in 2011 to assess the treatment plant and identified projects that focus on rehabilitation or replacement of existing infrastructure with similarly capacity. No process capacity expansion projects were identified in the Capital Improvement Plan.

3.2 EXISTING RECYCLED WATER FACILITIES

CMSA currently produces Disinfected Secondary-23 recycled water and sends it to Remillard Park pond to provide habitat for an endangered species of turtle. Recycled water is provided during the dry season when requested by the City of Larkspur due to a low water level in the pond. Figure 3.4 shows the location of Remillard Park pond. CMSA does also use 3W for onsite irrigation and plant service water.

CMSA also recently received approval from the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) for a truck filling station for licensed commercial haulers using water in MMWD's service area. The filling station is planned to be operational by end of 2015.

EXISTING
RECYCLED WATER USER

FIGURE 3.4

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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3.2.1 Current User and Demands

CMSA provides water to Remillard Park pond when requested during the summer months. Remillard Park pond is owned and maintained by the City of Larkspur Public Works Department. Typically, Remillard Park pond requests water for two to four weeks during the summer months. Water deliveries range from 216,000 gpd to 400,000 gpd. This equates to approximately 3,024,000 to 11,200,000 gallons per summer. Recycled water was requested in the summer of 2014 and 2015; however, no water was requested in the previous several years. The recycled water sent to Remillard Park pond is not blended with potable water. Instead, the recycled water is simply disinfected and dechlorinated.

3.3 RECYCLED WATER AGREEMENTS

CMSA is currently under agreement to provide recycled water to the Remillard Park pond for their use as described below. A copy of the existing agreement is included in Appendix B.

3.3.1 Remillard Park Pond

In a 1988 agreement between CMSA and the City of Larkspur, CMSA agreed to provide recycled water as needed for maintaining the water level in Remillard Park pond. The agreement states that ‘a minimum of a two-foot freeboard is to be maintained at all times’ in the pond. Per the agreement, the median number of coliform organisms in this water shall not exceed 23 MPN per 100 milliliters and sampling for total coliform shall be conducted daily during discharge to the pond. Additionally, the Regional Board shall be given 5 days advanced notice of the intention to use reclaimed water and signs shall be posted at the pond noting the presence of reclaimed water.

3.4 POTENTIAL SOURCES OF RECYCLED WATER

As discussed, the CMSA WWTP is the primary source of recycled water for this project. Currently, the ADW flow rate is approximately 5.0 mgd, which would be available for recycled water use during the May through October irrigation season. An alternative source of supply could be through a satellite treatment facility located in the Ross Valley Sanitary District wastewater collection system; this option will be evaluated further in Chapter 6.

TREATMENT REQUIREMENTS FOR DISCHARGE AND REUSE

This chapter summarizes the regulatory and additional water quality requirements for a recycled water system as well as the water quality requirements for the wastewater treatment plant's secondary effluent.

4.1 OVERVIEW OF REGULATORY REQUIREMENTS

The primary regulation governing recycled water use is the California Water Code of Regulations, Title 22. Because of the intended use of the recycled water, the treatment requirement for this project would be tertiary treated recycled water, unrestricted use. The CMSA, the source of the recycled water for the project, is located in the San Francisco Bay Region, which is Region 2 of the state's regulatory agencies.

In June 2014, California legislature passed State Bill 861, which authorized transfer of California Department of Public Health's (CDPH's) drinking and recycled water responsibilities, including the issuance of waste discharge requirements (WDRs), to the SWRCB. Now, regulatory authority for projects using recycled water falls to the Division of Drinking Water (DDW) within the SWRCB as well as the Regional Water Quality Control Board (RWQCB). The roles of the SWRCB, RWQCB, and DDW are further discussed in the following paragraph.

The SWRCB establishes general policies governing the permitting of recycled water projects consistent with its role of protecting water quality and sustaining water supplies. The SWRCB also exercises general oversight over recycled water projects, including review of RWQCB permitting practices. The DDW (formerly, CDPH) is charged with protection of public health and drinking water supplies and with the development of uniform water recycling criteria appropriate to particular uses of water. The RWQCB is charged with protection of surface and groundwater resources and with the issuance of permits that implement DDW recommendations.

CMSA currently provides recycled water to Remillard Park to maintain the water level in the existing pond. Because there have been no adverse water quality impacts associated with the use of this recycled water, the RWQCB did not issue waste discharge requirements for this recycled water use. The agreement for this recycled water use can be found in Appendix B.

4.2 WASTEWATER DISCHARGE REQUIREMENTS

The CMSA WWTP provides secondary treatment for its three (3) member agencies, as noted in Chapter 1 as well as San Quentin Prison. The WWTP average dry weather permit capacity is 10 mgd with a wet weather treatment capacity of 125 mgd. The treatment processes at the WWTP, as noted in Chapter 3, consist of preliminary, primary, secondary treatment, disinfection, and solids handling.

Discharge effluent limitations are required by the WWTP's National Pollutant Discharge Elimination System Permit (NPDES), RWQCB Waste Discharge Requirements Order No. R2-2012-0051 (NPDES Permit No. CA0038628), for conventional water quality constituents are shown in Table 4.1. The full permit is included in Appendix C. The CMSA WWTP is in compliance with these requirements and has not had an NPDES exceedance in over 10 years.

Table 4.1 Effluent Limits in the 2012 NPDES Permit[1]
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Constituent	Units[2]	Average Monthly	Average Weekly	Maximum Daily	Instantaneous Min	Instantaneous Max
5-day CBOD @ 20°C	mg/L	25	40	---	---	---
Total Suspended Solids (TSS)	mg/L	30	45	---	---	---
$CBOD_5$ and TSS % Removal	%	85 (min)	---	---	---	---
Oil and Grease	mg/L	10	---	20	---	---
pH	standard units	---	---	---	6.0	9.0
Chlorine, Total Residual	mg/L	---	---	---	---	0.0
Total Coliform Bacteria[3]	MPN/100 mL	240	---	---	---	10,000
Enterococcus Bacteria[4]	colonies/100 mL	35		---	---	---
Copper, Total Recoverable	μg/L	49	---	85	---	---
Cyanide, Total Recoverable	μg/L	21	---	41	---	---
Dioxin-TEQ	μg/L	1.4×10^{-8}	---	2.8×10^{-8}	---	---
Ammonia, Total (as N)	mg/L	60	---	120	---	---
Dissolved Oxygen[5]	mg/L	---	---	---	5.0	---

Notes:
(1) Limits included in Waste Discharge Requirements Order No. R2-2012-0051, NPDES Permit No. CA0038628.
(2) Abbreviations: mg/L = milligrams per liter; μg/L = micrograms per liter; MPN = most probable number; NTU = nephelometric turbidity units.
(3) The geometric mean of the total coliform density of all discharge samples collected within each calendar month shall not exceed 240 MPN/100mL and the daily maximum shall not exceed 100,000 MPN/100 mL.
(4) The geometric mean of the enterococcus densities of all discharge samples collected within each calendar month shall not exceed 35 colonies/100mL.
(5) The effluent shall not cause the dissolved oxygen concentration of the receiving waters to fall below a minimum of 5.0 mg/L within one foot of the water surface.

4.3 RECYCLED WATER REGULATIONS

The SWRCB, DDW, and the RWQCBs have regulatory authority over projects using recycled water. The following sections summarize existing regulations that govern recycled water systems. The types of recycled water under consideration include urban irrigation, commercial uses, dual plumbing, and limited direct potable reuse (DPR).

4.3.1 Title 22 of the California Code of Regulations

With the passage of SB861, DDW is now the State's primary agency responsible for the protection of public health, the regulation of drinking water, and the development of uniform water recycling criteria appropriate for particular uses of water. CDPH (now DDW) promulgated regulatory criteria in Title 22, Division 4, Chapter 3, Section 60301 et seq., California Code of Regulations (Title 22). Additional information on recycled water regulations and a link to Title 22 of the CCR can be found at http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Lawbook.shtml. Title 22 regulations define four types of recycled water determined by the treatment process and water quality criteria including total coliform, bacteria, and turbidity levels. The four treatment types of recycled water that are currently permitted by DDW under Title 22 regulations are summarized in Table 4.2.

Table 4.2 Approved Uses of Recycled Water
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Treatment Level	Approved Uses	Total Coliform Standard (median)
Disinfected Tertiary Recycled Water	Spray Irrigation of Food Crops Landscape Irrigation(1) Non-restricted Recreational Impoundment	2.2 / 100 mL
Disinfected Secondary - 2.2 Recycled Water	Surface Irrigation of Food Crops Restricted Recreational Impoundment	2.2 / 100 mL
Disinfected Secondary - 23 Recycled Water	Pasture for Milking Animals Landscape Irrigation(2) Landscape Impoundment	23 / 100 mL
Undisinfected Secondary Recycled Water	Surface Irrigation of Orchards and Vineyards(3) Fodder, Fiber and Seed Crops	N/A

Notes:
(1) Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
(2) Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.
(3) No fruit is harvested that has come in contact with irrigating water or the ground.

4.3.2 Recycled Water Policy

The SWRCB recognizes that a burdensome and inconsistent permitting process can impede the implementation of recycled water projects. In 2009, the SWRCB adopted a new Recycled Water Policy (SWRCB Res No. 2009-0011, RW Policy). The stated purpose of the Policy is “to increase the use of recycled water from municipal wastewater sources […]” (SWRCB, 2012) to allow the state to become more independent from its existing water supply sources, which are subject to significant climatic disruptions. In addition, as a separate measure, the Policy helps to “preserve, enhance, and restore the quality of California’s water resources” (SWRCB, 2009). The adopted Recycled Water Policy (RW Policy) establishes more uniform requirements for water recycling throughout the State and streamlines the permit application process in most instances.

The RW Policy includes a mandate that the State increase the use of recycled water over 2002 levels by at least 200,000 AFY by 2020 and by at least 300,000 AFY by 2030. Also included are goals for stormwater reuse, conservation and potable water offsets by recycled water. The onus for achieving these mandates and goals is placed both on recycled water purveyors and potential users.

Absent unusual circumstances, the RW Policy puts forth that recycled water irrigation projects that meet DDW requirements, and other State or Local regulations, be adopted by Regional Boards within 120 days. These streamlined projects will not be required to include a monitoring component.

The RW Policy requires that Salt and Nutrient Management Plans for every basin in California be developed and adopted as Basin Plan Amendments by 2015. These Management Plans will be developed by local stakeholders and funded by the regulated community.

The SWRCB Staff has proposed an amendment to the RW Policy to add monitoring requirements for contaminants of emerging concern (CECs) in recycled water. In 2009, in accordance with the RW Policy, the SWRCB convened a science advisory panel (Panel) to provide guidance on future actions related to monitoring CECs in recycled water. This Panel submitted a report titled: “Monitoring Strategies for Chemicals of Emerging Concern in Recycled Water – Recommendations of a Science Advisory Panel” (Panel Report). The Panel Report provided recommendations for monitoring specific CECs in recycled water used for groundwater recharge reuse. For recycled water used for landscape irrigation, the Panel did not recommend monitoring of CECs, but recommended monitoring of some surrogates. The SWRCB incorporated the Panel’s recommendations into a proposed amendment to the RW Policy, which consists of two parts. The first part revises the original RW Policy. The second part is a new Attachment A for the RW Policy.

4.3.2.1 <u>Salt and Nutrient Management Plan</u>

The 2009 RW Policy mandated that a Salt and Nutrient Management Plan (SNMP) be prepared for basins where recycled water is to be used, and required the SNMP to include plans for monitoring CEC. The plans were to be completed by 2015, and include collaboration from local water, wastewater, and contributing stakeholders.

In 2013, the DRAFT *Bay Area Integrated Regional Water Management Plan* included guidance on development of SNMPs in the Region. This guidance was actually developed as part of the Sonoma Valley SNMP effort, which was used as an example in the guidance document. Though no SNMP has been developed for the CMSA watershed, Sonoma Valley, Zone 7 Water Agency and Santa Clara Valley Water District are developing SNMPs, which will likely be used as examples for the Region.

4.3.3 Recycled Water General Order

The SWRCB adopted a General Order (WQO 2014-0090) on June 3, 2014 to streamline permitting for recycled water. Coverage under this General Order is limited to treated municipal wastewater for non-potable uses. It does not apply to the use of recycled water for groundwater recharge, or the disposal of treated wastewater by means of percolation ponds. The General Order establishes standard conditions for the use of recycled water, relieving producers, distributors and users of recycled water from the sometimes lengthy permit approval process and providing them with certainty around the requirements that they will be expected to meet.

If CMSA were to construct a recycled water facility as a result of this Feasibility Study, it is expected that a new recycled water permit would be required. Though a site-specific permit may ultimately be needed, it is advantageous for CMSA to pursue permitting under this WQO as a first step. To obtain coverage under the Order, CMSA will be required to submit a Notice of Intent and an application fee to the RWQCB.

4.3.4 Direct Potable Reuse

DPR is the incorporation of purified recycled water directly into the treated water supply of a community without the use of an environmental buffer such as an aquifer or a surface water. Thus, DPR avoids the problems related to groundwater injection and extraction, commonly found with indirect potable reuse (IPR) projects. DPR has become a reality in the United States, with two projects nearing completion and operation (Big Spring, Texas and Cloudcroft, New Mexico). In California, the state legislature has directed the DDW to draft a feasibility report on a regulatory framework for DPR by December 31, 2016.

Further, there is ongoing research on how to properly implement DPR projects in California and nationally. While no standards have been set in California for DPR treatment, it is likely that such standards will be similar to, but more stringent than, standards for IPR projects. For groundwater recharge IPR projects, the DDW requires that full advanced treatment be provided to achieve at least 12-log_{10} enteric virus reduction and 10-log_{10} protozoa (*Giardia* and *Cryptosporidium*) removal or inactivation from raw wastewater for microbial pathogens (CDPH, 2014). In addition to the pathogen control required by DDW, a target of 9-log_{10} removal of total coliform is suggested to conform to the most recent industry recommendations, established by a panel of national experts convened by the National Water Research Institute (NWRI) in the context of WateReuse Research Foundation Project No. 11-02, *Equivalency of Advanced Treatment Trains for Potable Reuse* (NWRI, 2013). Log reduction credits may be applied to all treatment processes provided that at least three processes provide a minimum of 1-log reduction of each pathogen of concern. Also, each process needs a minimum of 1-log_{10} of credit and three processes need to have the 12-10-10 log_{10} removal credits combined. Each process also has a maximum of 6-log_{10} credit for any of the pathogens.

It is likely that requirements for DPR will exceed the requirements outlined above for IPR treatment. As a conservative approach, it was assumed that DPR treatment must meet a 14-log_{10} virus reduction, a 12-log_{10} protozoa removal, and an 11-log_{10} bacteria removal. For the purposes of this study, the treatment train outlined in Table 4.3 will be used. This treatment train meets the likely DPR treatment goals by providing 15-log_{10} virus removal, 18.5-log_{10} bacteria removal, and 12-log_{10} protozoa removal. If a DPR project moves forward these treatment goals and the necessary treatment train should be re-evaluated once the DDW develops a regulatory framework for DPR.

Table 4.3 Possible Treatment Train Constituent Reductions for DPR at CMSA Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District

	Ozone(1)	BAF	MF	RO	UV/H_2O_2(2)	Cl_2
Bacteria	3.0-log	0.0-log	3.5-log	2.0-log	6.0-log	4.0-log
Virus	3.0-log	0.0-log	0.0-log	2.0-log	6.0-log	4.0-log
Protozoa (Crypto)	0.0-log	0.0-log	4.0-log	2.0-log	6.0-log	0.0-log
Estradiol Equivalency (EEQ)	70%	50%	50%	95%	80%	25%
Trace Organic Constituents (TOrCs)	99%	50%	40%	95%	60%	25%
N-nitrosodimethylamine (NDMA)	--	50%	0%	50%	90%	0%
Total Organic Carbon (TOC)	5%	30%	5%	99%	0%	0%

Notes:
(1) Dosage assumed was 1 mg-min/L with a CT value of 2 min.
(2) Dosage assumed was 920 mJ/cm^2.

4.3.5 Dual Plumbing

The use of recycled water for toilet and urinal flushing is encouraged by the DDW as long as such use does not cause any loss or diminution of existing water rights. An engineering report pursuant to Section 60323 of Title 22 of the CCR that includes plumbing design, cross-connection control, and monitoring requirements must be prepared.

In order to provide recycled water for toilet and urinal flushing, dual plumbing is required per the 2013 California Plumbing Code. Such dual plumbing is not allowed to have any cross connections to the potable water system except via an air gap or via a temporary connection for initial testing. Furthermore, any recycled water piping must be permanently marked as carrying recycled water and all rooms using recycled water must have signs stating that recycled water is used and that it is non-potable. In addition to required initial testing for cross-contaminations, annual visual inspections are required for any dual plumbing system.

4.4 WATER QUALITY RELATED REQUIREMENTS

4.4.1 Incidental Runoff

The CMSA recycled water permit will likely establish requirements to prevent runoff of recycled water into surface water bodies. The RW Policy defines incidental runoff as unintended small amounts of runoff from recycled water use areas, such as unintended, minimal over-spray from sprinklers that escapes the recycled water use area. Water leaving a recycled water use area is not considered incidental if it is part of the following:

- Facility Design.
- Excessive Application.
- Intentional Overflow or Application.
- Negligence.

Incidental runoff may be regulated by waste discharge requirements, or when necessary, through a NPDES permit. Regardless of the regulatory instrument, the project shall include the following practices:

- Implementation of an operations and management plan that provides for detection of leaks, and correction within 72 hours of learning of the runoff, or prior to the release of 1,000 gallons, whichever occurs first.
- Proper design and aim of sprinkler heads.
- Refraining from application during precipitation events.

- Management of any ponds containing recycled water such that no discharge occurs unless discharge is a result of a 25-year, 24-hour storm event or greater, and there is notification of the appropriate Regional Water Board Executive Officer of the discharge.

4.4.2 Title 22 Use Area Requirements

Title 22 specifies use area requirements for recycled water including the following:

- Irrigation runoff shall be confined to the recycled water use area.
- Spray, mist or runoff shall not enter dwellings.
- Drinking water fountains shall be protected against contact with recycled water.
- Recycled water use areas shall be posted with signs stating its use.
- No physical connections shall be made between the recycled water and potable water systems.
- Hose bibs shall not be included in public areas where recycled water is in use.

4.4.3 General Irrigation Use Guidelines

Current potable water sources for Marin Municipal Water District have significantly lower total dissolved solids (TDS) than the recycled water supply, which may have ramifications for its use irrigating salt-sensitive species and may require slightly increased irrigation volumes (to leach out accumulating salts), potable water blending and/or landscaping alterations.

The successful long-term use of recycled irrigation water depends more on rainfall, leaching, soil drainage, irrigation water management, salt tolerance of plants, and soil management practices than upon water quality itself, though a minimum water quality is also necessary.

Since salinity problems may eventually develop from the use of any water due to its mineral content, the following measures can be implemented to manage salinity in either agricultural or community-based irrigation:

- Irrigate more frequently to maintain an adequate soil water supply.
- Select plants that are tolerant of an existing or potential salinity level.
- Routinely use extra water to satisfy the leaching requirements.
- If possible, direct the spray pattern of sprinklers away from foliage. To reduce foliar absorption, try not to water during periods of high temperature and low humidity or during windy periods. Change time of irrigation to early morning, late afternoon, or night.
- Maintain good downward water percolation by using deep tillage or artificial drainage to prevent the development of a perched water table.

On-site maintenance concerns include additional conversion costs from potable irrigation valves and appurtenances to equipment that is more compatible with recycled water, due to higher salinity and salt build up in sprinkler heads.

General management/use guidelines were developed in 1985 (Ayers and Westcott) for landscape and crop irrigation based on the average constituent quantity in the irrigation water. These are widely-accepted use-restriction criteria for recycled water. Table 4.4 compares these management/use guidelines with recycled water data from CMSA WWTP. The table also indicates the degree (slight, moderate or severe) to which each water quality parameter could potentially affect plant growth.

4.4.4 Salinity Concerns

Most parameters in Table 4.4 show that recycled water from CMSA WWTP has a slight to moderate degree of recommended restrictions on use.

The main use restriction for the recycled water is salinity, as shown by the high Electrical Conductance (EC) and TDS values. High EC and TDS values are mainly due to the infiltration of brackish groundwater into the sanitary sewer collection system. Salinity is not removed during treatment at the CMSA WWTP. Because of these high salinity values, it is likely that any recycled water alternative will need to provide some level of salinity reduction treatment. Such treatment options are further explored in Chapter 6.

Table 4.4 Comparison of CMSA Recycled Water Quality with Established Guidelines for Interpretations of Water Quality for Irrigation
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Parameter	Units	Established Criteria Degree of Use Restriction(1,2) None	Slight	Severe	CMSA RW Effluent
Salinity					
Electrical Conductance (EC)	dS/m	<0.7	0.7 - 3.0	>3.0	2.1(3)(4)
Total Dissolved Solids (TDS)	mg/L	<450	450 - 2000	>2000	1233(5)
Permeability					
aSAR = 0 - 3 and EC		>0.7	0.7 - 0.2	<0.2	
= 3 - 6 and EC		>1.2	1.2 - 0.3	<0.3	
= 6 - 12 and EC		>1.9	1.9 - 0.5	<0.5	
= 12 - 20 and EC		>2.9	2.9 - 1.9	<1.9	
= 20 - 40 and EC		>5.0	5.0 - 2.9	<2.9	
Sodium					
Root Absorption	SAR	<3	3 - 9	>9	--
Foliar Absorption	mg/L	<70	>70		--

Table 4.4 Comparison of CMSA Recycled Water Quality with Established Guidelines for Interpretations of Water Quality for Irrigation
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Parameter	Units	Established Criteria Degree of Use Restriction[1,2] None	Slight	Severe	CMSA RW Effluent
Chloride					
Root Absorption	mg/L	<140	140 - 355	>365	540[3]
Foliar Absorption	mg/L	<100	>100		540[3]
Boron	mg/L	<0.7	0.7 - 3.0	>3.0	--
pH	–	6.5 - 8.4 (normal range)			6.4 – 8.0[5]
Ammonia (NH_4)	mg/L	(see combined N values below)			29[5]
Nitrate (as NO_3)	mg/L	(see combined N values below)			13[6]
Nitrate (as N)	mg/L	(see combined N values below)			3.0[6]
Total Kjeldahl Nitrogen (N)[7]	mg/L	<5	5 - 30	>30	35[6]
Bicarbonate (HCO_3)[8]	mg/L	<90	90 - 500	>500	--

Notes:
(1) Adapted from University of California Committee of Consultants (1974) and Water Quality for Agriculture (Ayers and Westcot 1984).
(2) Definition of the "Degree of Use Restriction" terms:
None = Reclaimed water can be used similar to the best available irrigation water.
Slight = Some additional management will be required above that with the best available irrigation water in terms of leaching salts from the root zone and/or choice of plants.
Severe = Typically cannot be used due to limitations imposed by the specific parameters.
(3) Values listed are an average of data collected from Jan 2011 – Nov 2014.
(4) Note that the monthly average EC value from May to Oct of the same period was 2.5 dS/m.
(5) Values are based on monthly average effluent values measured at the CMSA WWTP from Jan 2012 to June 2014.
(6) Values listed are an average of data collected from July 2011 to July 2014.
(7) Total Kjeldahl Nitrogen (TKN) is the sum of the ammonia nitrogen and organic nitrogen. Organic nitrogen is bound in living material. Ammonia and nitrate are inorganic forms of nitrogen.
(8) Presence of bicarbonate can result in unsightly foliar deposits.

RECYCLED WATER MARKET ANALYSIS

The primary objective of this Recycled Water Feasibility Study (RWFS) was to identify and analyze opportunities for supplying additional recycled water within the CMSA service area. Increasing recycled water use in the area would provide potable water offset and beneficial use of the CMSA wastewater effluent.

This chapter summarizes the process of identifying and quantifying uses for recycled water within the CMSA service area such as irrigation, commercial reuse, dual-plumbing and DPR. This chapter also discusses the customer outreach efforts that are currently underway.

5.1 RECYCLED WATER USE CATEGORIES

Since the communities CMSA serves are mainly residential/commercial areas, with limited process and industrial uses, the main focus of the recycled water market was on urban uses (i.e., landscape and commercial) as described in more detail below. In addition, potential uses for recycled water at nearby San Quentin Prison were also explored.

Agricultural irrigation was not considered as a potential recycled water use due to limited agricultural land within the study area. Groundwater recharge was also not analyzed since the hydrogeologic formations within the study area are not conducive to groundwater recharge as there are no significant aquifers in the study area, which is predominately underlain by rock (MMWD Urban Water Management Plan, 2010).

5.1.1 Landscape Irrigation

The majority of potential recycled water use considered within the CMSA service area was related to landscape irrigation. The largest demand candidates within this category include parks, schools, and landscape irrigation within large commercial parcels, Home Owner Associations (HOAs) and within the San Quentin Prison campus.

5.1.2 Commercial Uses

Several commercial uses were identified as potential recycled water users: car washes and cooling/boiler operations in larger commercial centers as well as operational uses such as truck filling and washdown.

5.1.3 Dual-Plumbed Uses

Because of the proximity of San Quentin Prison to CMSA and its higher use of potable water relative to the other residential / commercial uses in the CMSA service area, dual-plumbing of the prison was considered as an alternative use for recycled water.

5.1.4 Direct Potable Reuse

Though groundwater recharge is not viable in the surrounding area, DPR was considered as a possible method of augmenting the local water supply. DPR could be conducted independently or in conjunction with a water reuse facility that provides recycled water for other urban uses.

5.2 RECYCLED WATER MARKET IDENTIFICATION

Expanding on each of the above recycled water uses, potential uses and/or customers were identified for each of the possible types of recycled water as described in more detailed below.

5.2.1 Landscape Irrigation

There is currently no recycled water use within the CMSA service area. To identify potential urban recycled water customers within the study area, MMWD, the area’s potable water supplier, provided their database of current landscape irrigation customers within the CMSA service area. The customer database combined with the GIS data for the CMSA service area allowed for identification of 166 potential irrigation customers. Through discussions with MMWD and CMSA, two additional irrigation customers were identified that were not included in the MMWD database. These include:

- Larkspur Landing Office Park.
- Bike Path Corridor along the coast near Niven Park.

5.2.2 Commercial Uses

In addition to the potential irrigation customers, commercial uses were identified within the CMSA service area including two (2) car washes and twenty-one (21) cooling operations at many of the area’s larger commercial centers and public facilities. Commercial operational uses considered included washdown at Marin Sanitary Service’s transfer station and a truck filling station.

5.2.3 Reuse within San Quentin Prison

The potential uses of recycled water within the San Quentin Prison campus are limited landscape irrigation of the grounds, make-up water for the boiler that provides heating and cooling of the facility, car washing for the facility's vehicles, and dual plumbing of the four (4) cell blocks housing the prison’s residents (for toilet flushing).

5.2.4 Direct Potable Reuse

As identified in Chapter 2, MMWD has not identified a short-fall in its water supply for the District. However, they do encourage implementing recycled water projects as an approach to diversifying and improving the reliability of their water supply. Augmenting the MMWD potable water system in the immediate vicinity of the CMSA treatment plant with highly purified water would improve overall system reliability. Therefore, DPR was also considered as a possible 'use' of recycled water for this study.

The location of the potential recycled water users (with the exception of DPR) noted above are illustrated in Figure 5.1 in relation to potential use. The recycled water use for each potential user is quantified in the next section.

5.3 RECYCLED WATER MARKET QUANTIFICATION

Once the potential recycled water customers were identified, the recycled water demand was estimated and/or confirmed for each type of customer using the methodology outlined below. The quantity of water that could be made available for DPR was also estimated.

5.3.1 Landscape Irrigation Requirements

In many cases, landscape irrigation customers use less water than necessary because of conservation practices and cost considerations. Conversely, some customers over-irrigate because of uneven sprinkler coverage or liberal watering practices. For those irrigation customers identified through the MMWD database, associated demand information was provided based on current use of potable water for irrigation (based on the average of 2012 and 2013 irrigation use data). Potable water use for irrigation has been steadily declining over the years due to improved conservation practices and therefore, while prior data was provided it seemed prudent to use the most recent data provided.

However, for those irrigation customers for which no demand data was available, theoretical landscape irrigation requirements for the CMSA area were calculated based on evapotranspiration (ET) and rainfall data. These calculated irrigation requirements were used to estimate annual irrigation requirements as well as to estimate peak month demand.

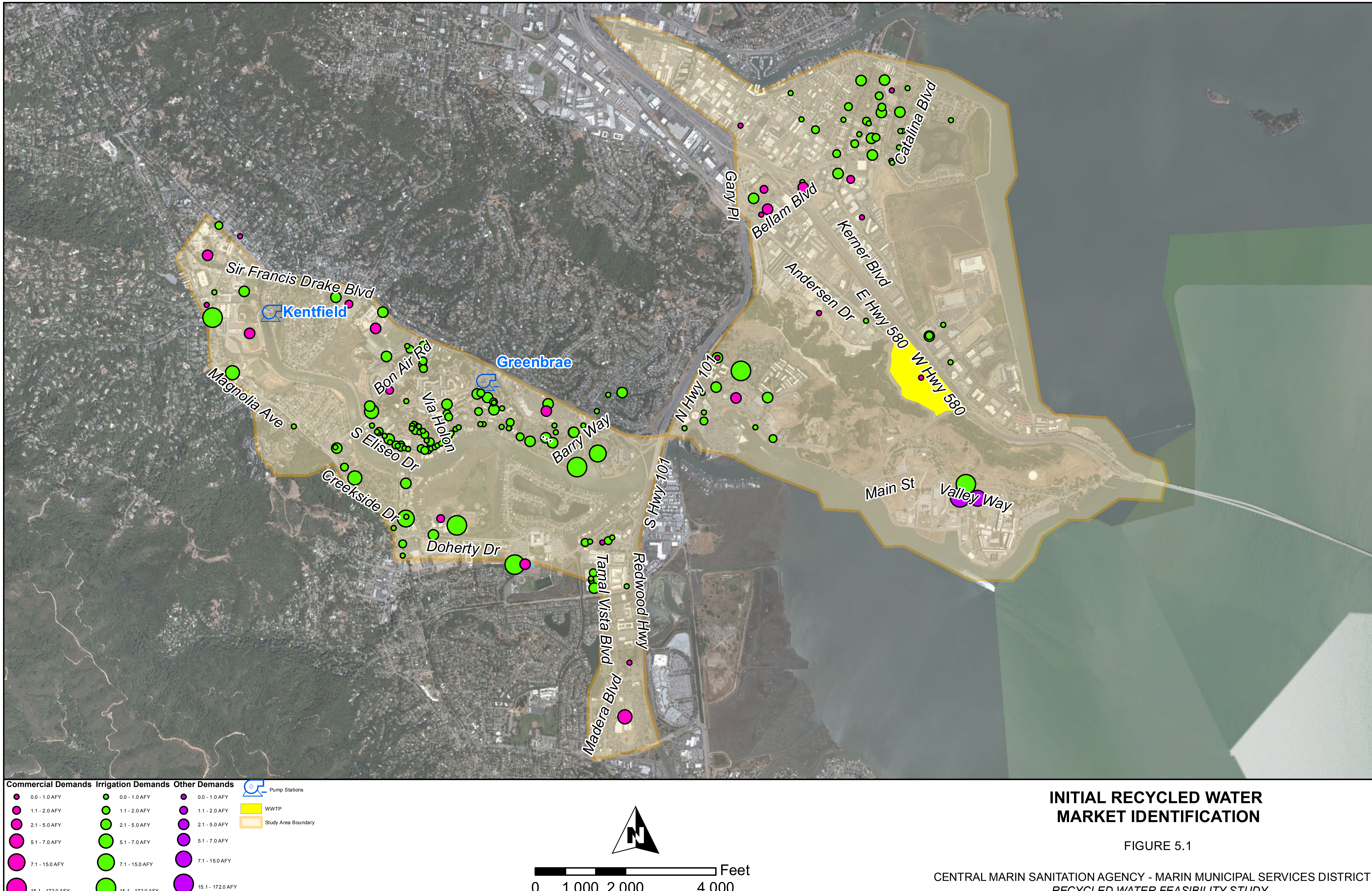
The amount of irrigation required for the potential irrigation customers is directly dependent on precipitation quantities and ET rates in the region. The amount of precipitation, ET, and irrigation required for the potential irrigation customers are listed in Table 5.1. To calculate the amount of ET occurring in the study area, the following formula was used:

$$ET_L = K_L * ET_o$$

Where: ET_L = Evapotranspiration of landscaped areas (in inches)

K_L = Landscaped area crop coefficient

ET_o = Reference evapotranspiration (in inches)



carollo

INITIAL RECYCLED WATER MARKET IDENTIFICATION

FIGURE 5.1

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

The reference ET was obtained from the California Irrigation Management Information System (CIMIS) Evapotranspiration database. CMSA is located in both Zone 5: Northern Inland Valleys, characterized by valleys north of San Francisco, and Zone 4: South Coast Inland Plains and Mountains North of San Francisco, characterized by more sunlight and higher summer ET_o than other coastal zones.

Table 5.1 Average Annual Landscape Irrigation Requirements
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Month	Landscape Area ET(1) (Inches)	Average Rainfall(1) (Inches)	Net Irrigation Requirement(2) (Inches)	Percent of Annual Net Irrigation Requirement(3) (%)
January	1.09	3.84	0	0%
February	1.66	4.58	0	0%
March	2.95	3.58	0	0%
April	4.17	1.66	2.51	8%
May	5.17	0.73	4.44	14%
June	6.15	0.29	5.86	19%
July	6.64	0.10	6.54	21%
August	5.83	0.06	5.77	19%
September	4.34	0.08	4.26	14%
October	2.81	1.56	1.25	4%
November	1.26	2.24	0	0%
December	0.93	5.38	0	0%
Total	**43.00**	**24.10**	**30.62**	**100%**
			2.5 feet	

Notes:
(1) Landscaped area evapotranspiration and rainfall is obtained from the California Irrigation Management Information System database and is an average of monthly ET and rainfall values from three stations: #63 Novato, #157 Point San Pedro, and #187 Black Point.
(2) Current month ET less the current month rainfall.
(3) Current month net irrigation requirement divided by total net irrigation requirement.

To calculate the ET_L, the landscaped area crop coefficient was estimated using information contained in the Guide to Estimating Irrigation Water Needs of Landscape Plantings in California by the California Department of Water Resources. The landscaped area crop coefficient is the product of an average species factor (k_s), density factor (k_d), and microclimate factor (k_{mc}). These were all estimated to be 1 with the assumption that the landscape coefficient is approximately equal to the reference ET_o value. This approximation assumes that urban irrigation will primarily consist of turf grasses which have ET_L values close to the reference ET_o. This approach resulted in a net annual average landscape irrigation requirement of approximately 31 inches or 2.5 feet per year. The irrigation season is roughly April through October, a period of 214 days. Landscape irrigation demand peaks in the month of July at 6.5 inches, 21 percent of the annual total.

5.3.2 Commercial Demand Requirements

Commercial demands are typically less seasonal in nature but can be weather dependent, especially in the case of car washes and cooling operations as is the case in this study. For the car washes included as potential recycled water customers, the demands associated with each facility were calculated based on the average number of cars washed per day (300), the amount of water used per car (30 gallons) and then amount of freshwater supplemented (50 percent, or 15 gallons), which results in 3.8 AFY / carwash facility.

Cooling operations were estimated based on the associated area (in square feet) of each facility to be cooled. A cooling demand factor of 0.03 gallons per day per square foot (gpd / sf) and a 6-month cooling period was assumed for the calculations. The cooling demand factor was derived based on Carollo experience on similar projects.

5.3.2.1 Operational Uses

The volume of recycled water needed for Marin Sanitary Service's (MSS) Transfer Station was estimated based on a conversation with Ron Piombo of MSS. He said that they typically use 1,000 gallons/day in the summer months for washdown, which results in an annual projected use of 0.64 AFY.

Additionally, CMSA recently built (December 2015) a recycled water truck filling station, which is planned to be used by licensed commercial haulers using recycled water in the MMWD service area. This filling station will have a 4 inch pipeline loop. An estimated potential volume of 0.5 AFY, would be used typically between March and October. This assumes a truck is filled once a day, six months out of the year.

5.3.3 San Quentin Demand Requirements

San Quentin Prison uses, though they fall within the other categories of uses (landscape irrigation and commercial), were quantified together with input from both MMWD account information and San Quentin staff. Irrigation demand for the prison campus was based on MMWD irrigation demand data.

The water use for the boiler was estimated based on conversations with Andy Crump of San Quentin Prison. He provided average summer and winter boiler use. It was assumed that summer use occurred half of the year and winter use occurred over the other half of the year. This analysis resulted in an overall estimate of 14.3 AFY for boiler use.

The dual plumbing potential demands were estimated based on calculations presented in a May 2007 memo on Estimated Recycled Water Use at San Quentin Prison attached as Appendix D. In this memo, a potential dual plumbing use of 121.7 AFY was estimated by assuming all 2,600 toilets were flushed 22 times per day. Each toilet uses 1.9 gallons per flush. These assumptions were verified by San Quentin Prison staff.

The potential recycled water demand for the customer sites identified in Figure 5.1 are summarized in Table 5.2 by type of use. Appendix E includes the complete list of potential customers.

Table 5.2 Initial Recycled Water Market Identification for Urban Uses
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Type of Use	Number of Sites	Total Estimated Annual Demand (AFY)
Landscape Irrigation		**404.9**
MMWD Irrigation Accounts	166	367.3
Additional Irrigation Identified	2	21.2
Commercial Uses		**44.7**
Cooling Tower Demands	21	35.9
Car Washes	2	7.6
Operational Uses	2	1.2
San Quentin Prison		**152.5**
Landscape Irrigation	1	16.4
Boiler Make-up Water	1	14.3
Dual Plumbing	1	121.7
Car Wash	1	0.1
Total		**602.1**

5.3.4 Direct Potable Reuse

A DPR advanced treatment facility would optimally operate at a consistent flow. The size of such a facility would be governed by the hydraulic limitation of the MMWD potable water system in that area as well as CMSA's diurnal flow pattern. In discussions with MMWD staff, they indicated that the potable water system in that area could handle as much as 5 mgd of average day flow of additional water without significant negative impact to hydraulic capacity of the system. However, currently, CMSA cannot supply 5 mgd, so a 2 mgd DPR facility was also analyzed.

5.4 POTENTIAL CUSTOMER SUB-GROUPS

The broad categories of customers, as shown in Table 5.2, was subdivided into six (6) sub-groups representing 6 geographical regions throughout the CMSA service area. These sub-groups were developed in order to help organize the service area into practical distinct regions that could be served recycled water independently. Each region was identified because it contained either one “anchor” customer (a relatively high single demand) or because it consisted of several densely spaced demands which, when aggregated together, could create a cost effective recycled water alternative. Approximately 75 percent of the identified urban use customers fell within these sub-groups. The remaining users were determined too small to be served cost effectively with recycled water.

Each sub-group is described in more detail below. Table 5.3 summarizes the identified irrigation and commercial recycled water demands for each of the six (6) sub-groups, while Figure 5.2 illustrates their proposed locations. A complete list of potential customers categorized by sub-group is included in Appendix E.

The CMSA and San Quentin sub-groups would only be served recycled water from a centralized tertiary facility located at the CMSA WWTP. The Greenbrae, Kentfield and Magnolia Ave sub-groups could be served either from CMSA WWTP or from satellite treatment nearer to those locations. Both options were considered and evaluated in Chapter 6.

Operational uses demands, estimated to be 1.2 AFY, as described in previous sections, are applicable only to the subgroups that are served out of the CMSA WWTP.

5.4.1 CMSA-North

The CMSA-North sub-group consists of a lot of smaller uses in close proximity to one another and to the CMSA WWTP. Predominantly made up of small irrigation uses, this sub-group also has two (2) car washes and four (4) cooling towers as potential uses.

5.4.2 San Quentin

The anchor customer for the San Quentin sub-group is the prison itself. There are several ways that recycled water may be used on the prison campus. The main cell blocks are currently dual plumbed and therefore, the most obvious and biggest potable offset would be to serve the toilets/urinals with recycled water for flushing. The prison is currently under contract with GHD to design an upgrade to their boiler system and could use recycled water for make-up water. Last, there is limited irrigation on the campus as well as a truck washing station for on-site vehicles.

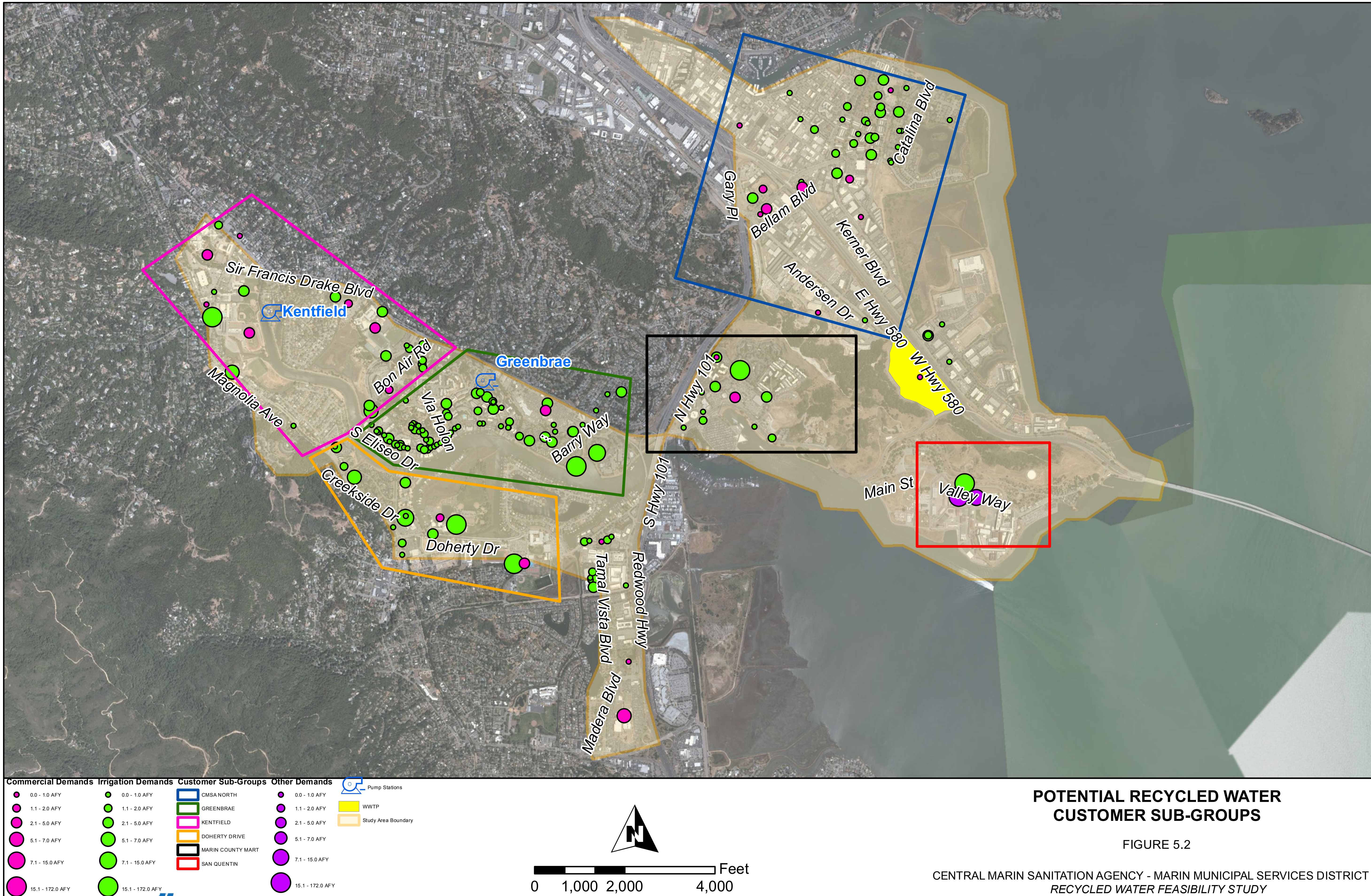
5.4.3 Marin Country Mart Area

The Marin Country Mart sub-group includes mostly irrigation customers. The one commercial customer within this sub-group is the Larkspur Landing shopping area, which has both irrigation and cooling tower uses.

Table 5.3 Total Potential Urban Reuse Customer Demands by Sub-group
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Sub-Group	Number of Customers	Average Annual RW Demand, AFY				Total Annual Potential RW Use (mgd)
		Irrigation	Commercial	Operation & Maintenance	Total	
CMSA North	27	32	11	1.2	44	0.04
San Quentin	4	16	136(1)	1.2	154	0.14
Marin Country Mart	11	31	3	--	34	0.03
Greenbrae	68	103	3	--	106	0.09
Kentfield	23	67	13	--	81	0.07
Doherty Drive	14	108	5	--	113	0.01
Total	**147(2)**	**357**	**171**	**1.2**	**532**	**0.47**

Notes:
(1) Includes boiler use, dual plumbing, and on-site car wash. Landscape irrigation for the baseball field is not included in the demand as they do not irrigate currently.
(2) The two Operation and Maintenance users included in both CMSA North and SQP are only counted once in the total.



POTENTIAL RECYCLED WATER CUSTOMER SUB-GROUPS

FIGURE 5.2

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

5.4.4 Kentfield

The Kentfield sub-group is anchored by a large irrigation customer, College of Marin, and has a number of commercial sites included as well. Cooling tower demands include the Kentwoodlands Shopping Center, Marin Catholic High School, Anthony Bacich Elementary School, AE Kent Middle School, Marin General Hospital and College of Marin campus.

5.4.5 Greenbrae

The Greenbrae sub-group is anchored by a large irrigation user, Larkspur Lands. The sub-group contains many small irrigation uses as well as one commercial use, the Bonair Shopping Center.

5.4.6 Doherty Drive

For the Doherty Drive sub-group, the anchor customers are two large irrigation uses, Redwood and Tamiscal High Schools and Piper Park. Four schools, San Andreas, Mewah Mountain Opportunity, Tamiscal and Redwood High Schools are the largest commercial uses. The remaining uses are small irrigation customers.

5.5 STAKEHOLDER INFORMATIONAL MEETING

An informational meeting was held with the largest potential user, namely San Quentin Prison on April 22, 2015. In addition to Carollo's team, staff from San Quentin Prison, the California Department of Corrections and Rehabilitation (CDCR), CMSA, and MMWD were present.

At this meeting, introductions were made and the study overview, timeline for project implementation, project costs, and rules/regulations were presented. Discussion focused on the following topics:

- Optimal pipe routing to San Quentin Prison.
- Facilities that could be retrofit for dual plumbing.
- Other potential onsite recycled water uses.
- The acceptability of DPR.
- Potential funding sources.

Overall, there was consensus for acceptance of the use of recycled water for dual plumbing, boiler use, irrigation, and onsite car washing. DPR for prison-only uses was not of interest to the stakeholders present. However, the prison and State officials did not object to DPR as long as it was part of an overall system augmentation and not focused solely on serving the prison.

The agenda, sign in sheet, and letters of support are contained in Appendix F.

Additionally, most of the irrigation users identified in this study are currently supplied by MMWD who is a partner of this study and thus, supports this study's objectives.

PROJECT ALTERNATIVES ANALYSIS

This chapter outlines alternatives considered to meet the project objectives for supplying recycled water within the CMSA service area.

Based on these objectives and considering the potential sub-groups outlined in Chapter 5, four (4) alternatives were developed that included: 1) reuse at San Quentin Prison, 2) urban reuse (landscape irrigation, commercial reuse) from centralized treatment, 3) urban reuse through satellite treatment, and 4) DPR. Within each of these initial alternatives, up to 5 sub-alternatives were assessed to select for the preferred alternatives to be further evaluated. Evaluation criteria, including both economic and non-economic considerations, were included in a cost-benefit analysis. The cost-benefit analysis conducted helped the team determine the Recommended Recycled Water (RW) Project for the CMSA area, which is detailed further in Chapter 7. A discussion of the alternatives considered and cost-benefit analysis are included within this chapter.

6.1 PLANNING AND DESIGN CRITERIA ASSUMPTIONS

The conceptual alternatives for the MMWD and CMSA RWFS were developed based on the recycled water market assessment described in Chapter 5 and the planning and design criteria defined in this chapter. The proposed criteria address how the recycled water system would be configured, considering characteristics such as treatment, pump station, storage capacity and distribution system size.

6.1.1 Alternatives Design Capacity

The design capacity for each alternative varies based upon the end uses identified for that alternative. Developing the design flow for each alternative begins with the average day annual (ADA) demand (in the case of recycled water for irrigation) or flow to be supplied (in the case of DPR). A seasonal and daily peaking factor is then added onto the ADA demand in order to size treatment and conveyance facilities.

6.1.1.1 Urban Reuse Peaking Factors

Peaking factors were used to address the normal variation in urban reuse demand throughout the year, which then influences how the recycled water system is sized. A recycled water treatment system is sized for the maximum daily demand whereas the recycled water system storage, pumping, and pipeline sizing requirements are based on the maximum hourly demand.

The peaking factors used to size the facilities in this RWFS can be defined as follows:

- Max Month Demand (MMD) – The highest monthly demand in the irrigation season; the max month peaking factor takes into account that demand in July is much higher than the average annual demand.
- Max Day Demand (MDD) – The max day factor accounts for the highest single-day water demand in the peak month.
- Peak Hour Demand (PHD) - The peak hour demand takes into account variations in demand over a 24-hour period.

Irrigation most commonly occurs at night over an 8-hour period; therefore, the peak hour irrigation demand is generally 3 times larger than the max day demand. Commercial cooling tower demands are also assumed to take place over an 8-hour period during the day, thus the peak hour factor is also 3 times the max day demand. Table 6.1 provides a summary of the peaking factors used for the MMWD/CMSA recycled water irrigation and commercial cooling tower customer projections.

Table 6.1 Urban Use Demand Peaking Factors
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

	Landscape Irrigation(1)	Commercial	Prison Boiler Use	Prison Dual Plumbing Use
Seasonal Factor (Peak Month)	1.8(2)	2.0	1.4(5)	1.0(7)
Max Day	1.8(3)	1.0	1.0(6)	1.2(8)
Peak Hour	3.0(4)	3.0	1.0(6)	2.0(9)
Total Peaking Factor	**9.7**	**6.0**	**1.4**	**2.4**

Notes:
(1) As applied to the average annual demand.
(2) Determined from MMWD data, based on a ratio of summer irrigation to winter irrigation.
(3) Determined from maximum daily ET values since 2003.
(4) The peaking factors could be reduced if irrigation were to occur during the day.
(5) Based on boiler water use data provided by SQP.
(6) It was assumed that boiler use was relatively constant.
(7) It was assumed that dual plumbing demand would not vary by season.
(8) Best professional judgment was used to develop this peaking factor.
(9) Based on the average wastewater peaking factors for two California Prisons: Deuel Vocational Institute and Chuckawalla Valley State Prison. Wastewater flow was used as a proxy for toilet flushing demand.

Prison peaking factors were also developed for both dual plumbing and boiler uses. It was assumed that boiler use would remain relatively constant over the course of a day. However, boiler use is seasonal, with greater demand in the winter time. Thus, a max month peaking factor of 1.4 was developed based on data from the Prison and max day and peak hour peaking factors for prison boiler use were both assumed to be 1.0. Prison peaking factors for dual plumbing were developed based on data from other California prisons and best professional judgment. It was assumed that toilet flushing would not vary by season so a max month peaking factor of 1.0 was used. While dual plumbing flow data was not available for any prison in California, the peak hour peaking factor was estimated based on available prison wastewater flow data. While wastewater flow data does not represent flow data for just toilet flushing, which is all that would be retrofit in a dual plumbing system, wastewater flow data is a good proxy for determining peaking factors for prison toilet use given the limited datasets available. A max day peaking factor of 1.2 was used based on wastewater flow data in prisons and best professional judgment. Table 6.1 summarizes the peaking factors developed. As shown in the table, the total peaking factor for dual plumbing at the prison is 2.4. For reference the overall peaking factor observed at the plant (Peak Hour Dry Weather Flow/ADWF) is around 2.6.

Given the available data, a 2.4 peaking factor for dual plumbing is reasonable. Based on discussions with San Quentin, toilet flushing is typically higher between 6 and 8 am and between 5 and 8 pm. Additionally, there are 2600 toilets at San Quentin that each use 1.9 gallons per flush and are limited to 22 flushes per day. Using a peaking factor of 2.4, each toilet would typically be flushed 2.2 times during high use times (6 - 8 am and 5 - 8 pm). During the remainder of the day, each toilet would be flushed 0.58 times per hour, or around once every 2 hours. Put another way, during each hour of high use times, 10 percent of daily allowed flushes are used. During each hour of non-peak use, 3 percent of daily allowed flushes are used. These assumptions are reasonable, given the data available.

6.1.2 Recycled Water Distribution System

All project alternatives will require a recycled water distribution system consisting of a pump station and distribution pipeline. More detail about each pipeline routing, sizing, and assumptions for each alternative are provided later in this Chapter. Table 6.2 presents the planning and design criteria used to develop distribution systems for each of the alternatives. Several of the criteria listed in Table 6.2 represent conservative planning assumptions. During more detailed predesign/design and as the commitment of potential customers becomes more certain, these planning and evaluation criteria may be refined.

6.1.2.1 Operational Storage for Urban Irrigation Alternatives

Operational storage is the amount required to provide the difference between the customer's peak hour demands and the treatment system's firm recycled water production capacity. A storage tank would allow the tertiary facilities to operate at a constant rate, sized to meet the MDD. For the purposes of this study, it was assumed that demands would occur as shown in Table 6.3.

Table 6.2	Recycled Water Distribution System Planning Criteria Summary Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District
Category	**Criteria**
Storage	
Recycled Water Operational Storage	$(PHD_{mgd} - MDD_{mgd})$ x (8 hours) x (1 day/24 hours)
Minimum Operational Storage	50,000 Gallons
DPR Storage	12 hour detention time x RO product water flow x 3 tanks
Recycled Water Distribution System	
Maximum Velocity	7 feet per second
Max Headloss/1,000-feet	7-feet
Minimum Pressure During PHD	50 psi
Pump Station Configuration	Duty + 1 standby

Table 6.3 Assumed Demand Timing
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Use	Time	Flow Rate
Irrigation	8 hours (10 pm - 6 am)	PHF
Commercial	8 hours (9 am - 5 pm)	PHF
Dual Plumbing	6 hours (6 am - 9 am; 5 pm - 8 pm)	PHF
	18 hours (remaining hours)	lower flow such that total daily flow equals MDF
Boiler	24 hours	PHF

As a conservative estimate, the required operational storage, in million gallons (MG), is calculated as follows:

Operational Storage =

$$(\mathrm{PHD} - \mathrm{MDD})\ \mathrm{x}\ (8\ \mathrm{hours}\ ) \times (1\ \mathrm{day} \div 24\ )$$

Where:

- MDD is the maximum day demand, in mgd.
- PHD is the peak hour demand, in mgd.

6.1.2.2 Secondary Effluent Storage

In addition to operational storage, it is important to ensure there is sufficient wastewater influent over a 24-hour period so the plant can meet the peak recycled water production demand (equal to the MDD). If the minimum diurnal wastewater flow is lower than the MDD for the recycled water system, then secondary effluent storage may be needed. This is referred to as Equalization Storage.

Currently minimum hour flows at CMSA are right around 1 mgd. Table 6.4 shows the MDDs of each alternative where CMSA is the water supplier, descriptions of these alternatives can be found in the sections that follow. Of these alternatives, Alternatives 2B, 4B and 4C would require additional storage. It is likely that the storage needs for Alternative 2B could be supplied by filling the existing vault of CMSA's emergency pump station during the day to offset low flows at night. For Alternative 4B, it was assumed that the existing storage pond at CMSA could be used. Alternative 4C requires more flow than is available at CMSA and is thus deemed infeasible in the sections that follow. Thus not additional secondary effluent storage is included in the alternatives described in the sections that follow.

Table 6.4 Maximum Day Demand for Alternatives that Use CMSA as Their Water Source
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alternative	MDD (mgd)
1A: SQP – Conventional	0.20
1B: SQP – MF	0.20
1C: SQP – MF/RO	0.20
2A: CMSA North	0.11
2B: Marin Country Mart, Greenbrae, Kentfield, Doherty Drive	1.15(1)
2C: Marin Country Mart Only	0.29(1)
4A: DPR - 0.5	0.70
4B: DPR - 2	2.80
4C: DPR - 5	7.00

Notes:
(1) These alternatives build onto alternative 1C. The max day demands shown include both the demands from alternative 1C plus the additional demands of each alternative.

6.1.2.3 Finished Water Storage for DPR Alternatives

Based on work done by Carollo on a WaterReuse Research Foundation DPR study (WRRF-11-10), finished water from a full advanced treatment system should be held to ensure adequate monitoring takes place prior to the DPR water being released into a potable water system. The study recommends finished water flowing into one of three storage tanks after the full advanced treatment. The three tanks are operated such that each cycles through in the following modes:

- Filling.
- Holding.
- Emptying.

Each storage tank is recommended to be sized for a 12-hour detention time based on the product water flow from the full advanced treatment.

6.1.3 Treatment Facilities and Considerations

In order to meet the recycled water quality requirements described in Chapter 4, each project alternative presented in this chapter would require new tertiary treatment facilities. The quality needed will range from simple filtration and disinfection to advanced treatment for DPR. Salinity removal may also be required for some alternatives due to the relatively high salinity in CMSA's effluent.

A summary of the treatment required for each alternative is presented in Table 6.5 along with the assumptions of the technologies used. Further discussion of why a particular treatment was chosen for the corresponding alternative is included below.

6.1.3.1 Filtration

Some level of tertiary filtration is needed for all recycled water uses considered in this RWFS. For centralized treatment, only tertiary filtration is needed since the source water is secondary treated wastewater. Two methods for tertiary filtration were considered for centralized treatment: Media Filters or Microfiltration. For satellite treatment, the source water is raw wastewater. Thus, a treatment process that can provide primary, secondary, and tertiary filtration is needed. The treatment process considered in this RWFS for satellite treatment is prescreening followed by membrane bioreactors (MBR). MBR was chosen for its small footprint. Media filters, microfiltration (MF), and MBRs are described in further detail below.

6.1.3.1.1 *Tertiary Filtration with Media Filters*

One type of tertiary filtration considered was continuous backwash filtration (CBW). A CBW system consists of a sand media filter that is constantly backwashing to remove the filtered particles with the use of filtered water and air. Air is supplied with an external air compressor. This system is most commonly used in recycled water systems due to its simple and cost effective operation. CBW is not a suitable pre-treatment technology for reverse osmosis.

Table 6.5 Treatment Assumption for Conceptual Project Alternatives Analysis Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District		
Alternative	**Type**	**Specific Technology**
Reuse at San Quentin Prison	Filtration	Continuous Backwash (CBW) or Microfiltration (MF)
	Salinity Reduction	Reverse Osmosis (RO)
	Disinfection	Ultraviolet (UV) light or Chlorine Contact
Urban Reuse – Centralized Treatment	Filtration Salinity Reduction Disinfection	MF RO UV
Urban Reuse – Satellite	Primary/Secondary/Filtration Disinfection	Membrane Bioreactor (MBR) UV
DPR	FAT	Ozone/Biologically Activated Filters (BAF)/MF/RO/UV/Sodium Hypochlorite

If recycled water is being delivered only to San Quentin Prison (SQP) and SQP is responsible for providing additional treatment as needed for their facilities, then CBW filtration could be an adequate choice for treatment.

6.1.3.1.2 *Tertiary Filtration with Microfiltration*

A second alternative for tertiary filtration is MF. The MF system consists of membrane modules, either submerged in a tank or enclosed in-vessel. Ancillary equipment for a membrane system includes an external air compressor to assist in membrane backwash as well as a clean-in-place chemical system for more rigorous membrane cleaning. The membrane system would be enclosed in a building. MF offers some advantages over CBW filtration in that it can produce a higher water quality, making it a suitable pretreatment technology for RO. However, the operation of an MF system is more complex than a CBW filter and it requires higher energy input and chemical use.

6.1.3.1.3 *Membrane Bioreactors*

The MBR process combines the activated sludge process with the use of MF or UF membranes for separation of solid and liquid phases, as opposed to removal by sedimentation and media filtration used in conventional activated sludge (CAS) or biological nutrient removal (BNR) plants. MBR treatment is the most widely used treatment process in small-scale satellite treatment applications. When combined with prescreening and disinfection, the MBR process can successfully treat raw wastewater to Title 22 recycled water standards. The MBR process is robust and can be a highly automated treatment process requiring little operator oversight. Additionally, the MBR filtration system provides a high-quality effluent with low turbidities, effectively lowering the disinfection requirements after treatment.

6.1.3.2 <u>Salinity Reduction</u>

As discussed in Chapter 4, the CMSA WWTP effluent is generally high in salinity. Thus, salinity treatment is required to use this water for the proposed RW uses, with the exception of dual plumbing. For centralized treatment, reverse osmosis (RO) is the most obvious choice for salinity reduction. RO is a high pressure membrane system that provides robust removal of pathogens, pollutants, and salt. Limited constituents smaller than 0.1 to 1 nm can pass through RO. RO will produce a concentrated waste stream (RO concentrate), which could be disinfected and combined with the CMSA WWTP effluent. To provide adequate pretreatment and to protect the RO units, membrane treatment (MF or UF) is required before the RO process.

Based on CMSA WWTP influent, to provide water that meets the recycled water quality standards outlined in Chapter 4, approximately 85 percent of the RW produced needs to be treated with RO. Blending of the RO treated RW with non-RO treated RW in the proposed 85 percent to 15 percent ratio would produce RW of sufficient quality. Thus, RO treatment proposed in this study will be sized for 85 percent of RW flow to be produced out of the CMSA WWTP.

For satellite treatment, no RO is required. The satellite locations were selected based on water quality data in the collection system that showed that salinity reduction (i.e., RO) was not needed.

6.1.3.3 <u>Disinfection</u>

In addition to filtration and salinity reduction, disinfection is also needed for all recycled water uses considered in this RWFS. Two disinfection methods were considered: ultraviolet (UV) disinfection and chlorine disinfection. These two disinfection methods are described further in the sections below.

6.1.3.3.1 *Disinfection with Ultraviolet*

UV disinfection uses ultraviolet light to disinfect rather than using chemicals. For the CMSA system, the UV would likely be an in-vessel system. In-vessel UV offers a compact footprint, which is advantageous for a space limited site. Due to differences in the water quality produced from the two technologies, a UV disinfection system downstream of MF can be sized for a lower dose and higher UV Transmittance, making it smaller than downstream of a CBW filter. A UV downstream of a CBW filter would be installed on a slab on grade but downstream of MF, it would be in the membrane building.

6.1.3.3.2 *Disinfection with Chlorine Disinfection*

Disinfection with chlorine is an acceptable alternative to UV and is already available at CMSA. In fact, there is potential for using a portion of the WWTP's existing chlorine contact basins. Since the basins are sized to handle all of CMSA's wet weather flows (up to 120 mgd), there is adequate tankage and one could potentially be used for tertiary disinfection during dry weather months.

Sodium hypochlorite disinfection typically includes a chemical dosing station and storage tank as well as concrete tank for contact time. Though energy use of a chlorine system is much less than for UV, chemical use is much higher and the footprint much larger than a comparable UV system. However, in the case of CMSA, the contact basins (which make up the majority of the footprint) are already in place.

An analysis was conducted to determine what changes would need to be made to the existing chlorine contact tanks to route tertiary filtered water through the tanks. That analysis as well as cost comparison is included in Appendix G.

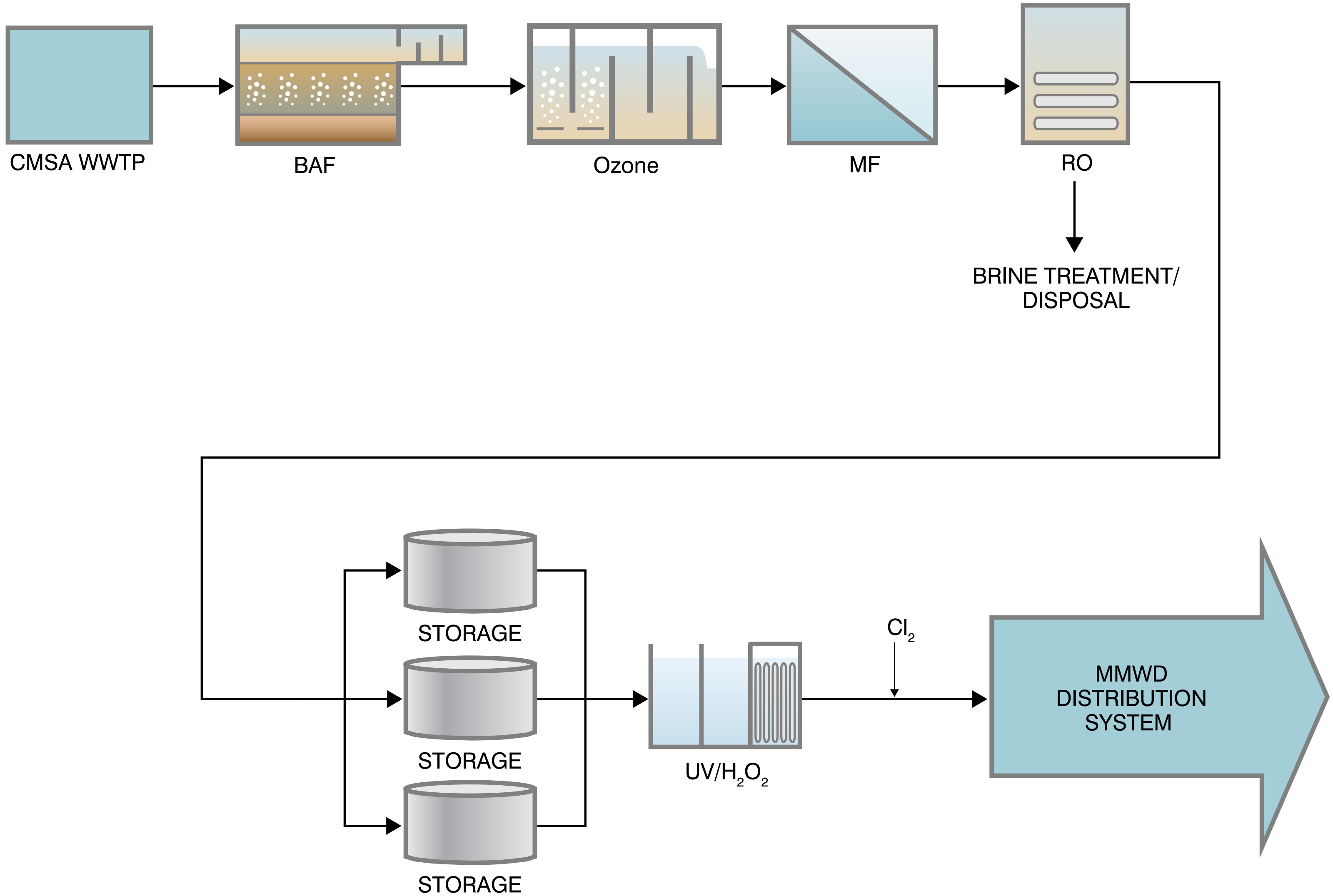
6.1.3.4 <u>Full Advanced Treatment</u>

DPR involves using recycled water directly as a water supply without an environmental buffer such as a large reservoir or the groundwater basin. There are currently no established regulations for DPR in California. However, the State has directed the Division of Drinking Water to develop a position statement and feasibility assessment for DPR by 2016.

As summarized in Chapter 4, there is a significant amount of research and discussion currently underway regarding the levels of treatment and controls required to safely apply DPR. Based on these ongoing discussions and the current regulations for indirect potable reuse, it is expected that the CMSA effluent would need to be treated using Ozone, BAF, MF/UF, RO, UV, and sodium hypochlorite. Between the RO and UV/sodium hypochlorite processes, the permeate from the RO process would be stored for a set period of time to allow for monitoring to ensure quality standards are met. The use of three tanks would allow a continuous supply of water. Water from the tanks would be treated by UV/hypochlorite and it would then be conveyed to a location within the potable water distribution system. Figure 6.1 illustrates a treatment schematic of a DPR system. Chapter 4 provides more detail on why this particular treatment train was chosen as well as the level of treatment provided.

6.1.4 Basis for Cost Estimates

The basis of costs used for the alternatives analysis within this RWFS is outlined in detail in Appendix H.



DPR TREATMENT PLANT SCHEMATIC

FIGURE 6.1

CENTRAL MARIN SANITATION AGENCY
RECYCLED WATER FEASIBILITY STUDY

carollo

cmsa0915f1-9637.ai

6.2 CONCEPTUAL ALTERNATIVES DESCRIPTION

Based upon the study objectives, several conceptual alternatives were identified and developed that would meet the project requirements. The conceptual alternatives can generally be described as the following:

- Reuse at San Quentin – using recycled water delivered from CMSA for four uses at San Quentin Prison: dual plumbing, boiler make-up water, onsite car washing, and landscape irrigation.
- Urban Reuse from Centralized Treatment – using recycled water delivered from CMSA for landscape irrigation and commercial use to offset potable water use.
- Urban Reuse from Satellite Treatment – pulling wastewater from a collection system pump station and treating it through a satellite treatment facility for urban reuse close to the point of treatment.
- Direct Potable Reuse – providing potable water offset using FAT and detention of the DPR effluent prior to discharge into the MMWD system.

6.2.1 Alternative 1 - Reuse at San Quentin

Due to the close proximity of CMSA WWTP and San Quentin Prison, it makes the most sense for tertiary treatment to be located at the CMSA WWTP and conveyed to San Quentin. Conveying RW to San Quentin would require installation of approximately 2 miles of pipe along Sir Francis Drake Boulevard and then turning left along Levee Road to the new boiler building at the prison. Figure 6.2 illustrates the general pipeline routing for this alternative, while Figure 6.3 shows the added construction measures needed to install the pipe once within the San Quentin Prison campus. With this proposed route, a small pipe bridge would be needed and directional drilling would be required to go under an existing maintenance building. Vaults and tees at the new boiler building and car wash location would also be provided.

Sizing treatment for this alternative requires estimating demands for dual plumbing the cell blocks, use of water in the new boiler system and historical irrigation use. Development of these demands is detailed in Chapter 5 and Section 5.3.3. The dual plumbing system would feed the North, South, East, and West blocks with recycled water for use in toilet and urinal flushing. Our understanding is that all four blocks are partially dual plumbed with separate piping feeding the toilets and sinks. Thus, all a retrofit would include is a new pipe riser and distribution line along the roof. This distribution line would connect to existing piping. Per San Quentin's request, copper piping was assumed for all in-building piping.

Legend

- Dual Plumbing and Boiler Piping
- CMSA
- San Quentin Prison

N

Feet
0 300 600 1,200

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SAN QUENTIN
PROPOSED PIPELINE ROUTING OVERVIEW

FIGURE 6.2

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Legend

Dual Plumbing and Boiler Piping

N

0 75 150 300 Feet

SAN QUENTIN
PROPOSED PIPELINE ROUTING DETAIL

FIGURE 6.3

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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6.2.1.1 Alternative 1A – San Quentin with Conventional Filtration (SQP – Conventional)

This San Quentin alternative would provide tertiary level treatment with CBW filtration. Though the CMSA effluent is high in salinity, it may be possible to use the higher salinity water with the existing and new dual plumbing system. The prison currently has copper piping and tubing installed in their existing partially dual plumbed system. In discussion with a corrosion expert (Tom Herink of JDH Corrosion) about the use of high salinity water in copper piping, under certain pH and flow conditions the corrosion potential may be low. RW treated centrally from CMSA will likely fall within these conditions and thus, the corrosion potential may be low. Therefore, RO treatment may not be needed.

However, it is likely that the boiler make-up water and the water used for irrigation would need salinity reduction, but for this alternative, it was assumed the prison would cover the install and cost for additional treatment (MF/RO) and locate these facilities at the prison.

This alternative also assumes the commercial truck fill station recently constructed at CMSA, which was identified in Chapter 5, will use recycled water. The other Operation and Maintenance (O&M) use identified in Chapter 5, namely MSS, requires lower salinity water than can be provided with this alternative and is thus not included with this option.

Major components for this alternative include:

- New tertiary treatment – conventional filtration (sand) and disinfection (Cl) located at the CMSA WWTP.
- Recycled Water Pump Station located at the WWTP.
- Distribution Pipeline, routing as proposed.

6.2.1.2 Alternative 1B – San Quentin with Microfiltration (SQP - MF)

Because of the high salinity in the CMSA effluent, any RW used for irrigation would need some level of salinity reduction. If conventional filtration were installed at CMSA, this would limit potential expansion of the RW system beyond the prison as any other irrigation customers would require a lower salinity water. Therefore, this alternative assumes MF for the filtration step, which can also serve as a pre-treatment step for RO, rather than using CBW filtration.

However, this alternative still assumes that any salinity reduction with RO would be installed and cost covered by San Quentin Prison for their use.

Like Alternative 1A, this alternative also assumes the commercial truck fill station recently constructed at CMSA, which was identified in Chapter 5, will use recycled water. The other Operation and Maintenance (O&M) use identified in Chapter 5, namely MSS, requires lower salinity water than can be provided with this alternative and is thus not included with this option.

Major components for this alternative include:

- New tertiary treatment – MF and disinfection (Cl) located at the CMSA WWTP.
- Recycled Water Pump Station located at the CMSA WWTP.
- Operational Storage located the CMSA WWTP.
- Distribution Pipeline, routing as proposed.

6.2.1.3 Alternative 1C - San Quentin with Microfiltration and Reverse Osmosis (SQ - MF/RO)

This option takes Alternative 1B a step further and assumes that not only will MF be provided, but RO will also be provided for salinity reduction. Adding RO would eliminate the need for further RW treatment before irrigation, commercial, and boiler use. Alternative 1C also assumes UV disinfection instead of chlorine disinfection. UV disinfection after RO is typically more cost effective chlorine due to its small size.

This alternative also assumes that both of the O&M uses identified in Chapter 5 will require recycled water. Both MSS and CMSA's commercial truck fill station will take RW directly from the CMSA WWTP.

Major components for this alternative include:

- New tertiary treatment – MF/RO and disinfection (UV) located at the CMSA WWTP.
- Recycled Water Pump Station located at the CMSA WWTP.
- Operational Storage located the CMSA WWTP.
- Distribution Pipeline, routing as proposed.

Table 6.6 summarizes the details of the sub-alternatives for San Quentin Prison (Alternative 1).

6.2.2 Alternative 2 - Urban Reuse - Centralized Treatment

Based on the market analysis in Chapter 5, there are five (5) potential sub-areas considered to serve irrigation and commercial RW uses outside of the San Quentin Prison campus. These 5 areas could be fed from a centralized RW treatment facility located at CMSA WWTP. Due to the high salinity in the CMSA WWTP effluent, it is assumed that tertiary treatment will need to include MF/RO to reduce the salinity to levels tolerable for irrigation use. Alternative 2 provides proposed pipeline routings from CMSA WWTP to the 5 subareas identified. Each routing is described in further detail herein.

Table 6.6 Alternative 1 - San Quentin Prison Detail Summary Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District						
		Estimated Demand		**Facilities Needed**		
Sub-Alt	**Treatment Type**	**Annual, AFY**	**Max Day(1), mgd**	**Pipeline Length, ft**	**Operational Storage, gallons**	**Pump Station Capacity, hp**
1A	CBW Filtration + Cl	154(2)	0.20	5800	91800	50
1B	MF + Cl	154(2)	0.20	5800	91800	50
1C	MF/RO + UV	154	0.20	5800	91800	50

Notes:
(1) MDD used for sizing of treatment facilities.
(2) It was assumed that SQP would provide all needed additional treatment for boiler, irrigation, and car washing demands on-site.

Alternative 2A – CMSA North is an independent alternative while Alternative 2B was originally planned in phases. Alternative 2B assumes that Alternative 1C, San Quentin Prison with MF/RO, is already implemented and that each subsequent phase is built off of the previous phase (Alternative 2B – Phase 1, 2 and 3). Alternative 2C is an abbreviated version of Alternative 2B Phase 1 – Marin Country Mart that would serve the shopping area only without continuing across Highway 101 into the Greenbrae area.

6.2.2.1 Alternative 2A – CMSA North

Alternative 2A – CMSA North feeds the RW users identified to the north of the CMSA WWTP. For this alternative, a 6 inch pipeline from the WWTP would be routed along Andersen Drive and then turn north onto Bellam Boulevard. Bellam Boulevard crosses under Highway 580 where it then heads towards the coast. Most of the proposed users for this CMSA North alternative are located past the Highway 580 crossing. The proposed pipe routing would continue onto Vista Del Mar and wind through the neighborhood, terminating near Bahia Vista Elementary School.

This alternative also assumes that both of the O&M uses identified in Chapter 5 will require recycled water. Both MSS and CMSA's fill station will take RW directly from the CMSA WWTP.

6.2.2.2 Alternative 2B Phase 1– Marin Country Mart

Alternative 2B – Phase 1 follows the proposed San Quentin Prison routing south of CMSA WWTP along Sir Francis Drake Boulevard. While at the coast, the proposed piping to San Quentin Prison turns east, the Marin Country Mart piping would start by turning west and continuing along Sir Francis Drake Boulevard to the Larkspur Landing Shopping Center. The pipe routing loops around Larkspur Landing Circle where it ends up back on Sir Francis

Drake Boulevard and crosses under Highway 101, terminating at Barry Way. The piping size needed to provide RW for the users in this phase, as well as all subsequent phases is 12 inches.

6.2.2.3 Alternative 2B Phase 2 – Greenbrae

This alternative continues the piping from Alternative 2B Phase 1, through neighborhoods on the northern bank of the Corte Madera Creek. All of the proposed piping of this alternative stays off of main roads and instead follows roads like Barry Way, Laderman Lane, Lower Via Casitas, Via Holon, and S Elieso Drive. The piping size needed to provide RW for the users in this phase, as well as all subsequent phases is 12 inches.

6.2.2.4 Alternative 2B Phase 3 – Kentfield

Alternative 2B Phase 3 picks up where Alternative 2B Phase 2 leaves off and follows Bon Air Road north to its intersection with Sir Francis Drake Boulevard. The proposed pipe routing follows Sir Francis Drake Boulevard west until it turns left onto McAllister Avenue and crosses Corte Madera Creek at the Stadium Avenue foot bridge. The pipe routing for this alternative then passes by A E Kent Middle School and makes a T at College Avenue to service a few additional potential RW users. The piping size needed for this phase is 6 inches.

6.2.2.5 Alternative 2B Phase 4 – Doherty Drive

Alternative 2B Phase 4 also picks up where Alternative 2B Phase 2 leaves off; however instead of following Bon Air Road north, like Alternative 2B Phase 3, this alternative routes RW piping south across the Bon Air Road bridge. The proposed routing then turns left at Magnolia Avenue and continues onto Doherty Drive where it terminates at Redwood High School. The piping size needed for this phase is 8 inches.

6.2.2.6 Alternative 2C - Marin Country Mart Only

Alternative 2C is an abbreviated version of Alternative 2B but stops short of installing the pipeline across Highway 101. Like Alternative 2B, Alternative 2C assumes Alternative 1C, San Quentin Prison with MF/RO, is already implemented.

Alternative 2C follows the proposed San Quentin Prison routing south of CMSA WWTP along Sir Francis Drake Boulevard. While at the coast, the proposed piping to San Quentin Prison turns east, the Marin Country Mart piping would start by turning west and continuing along Sir Francis Drake Boulevard to the Larkspur Landing Shopping Center. The pipe routing loops around Larkspur Landing Circle circling back on itself. The piping size needed to provide RW for the users in this alternative is only 6 inches.

6.2.2.7 Alternative 2 – Detail Summary

Major components for this alternative include:

- New tertiary treatment – MF/RO and disinfection (UV) located at the CMSA WWTP.
- Recycled Water Pump Station located at the CMSA WWTP.
- Operational Storage located at the CMSA WWTP.
- Distribution Pipeline, routing as proposed, for the 5 separate sub-areas.

Table 6.7 summarizes the details of the sub-alternatives for Alternative 2 – Urban Reuse with Centralized Treatment and Figure 6.4 illustrates the proposed location and pipeline routings for this alternative.

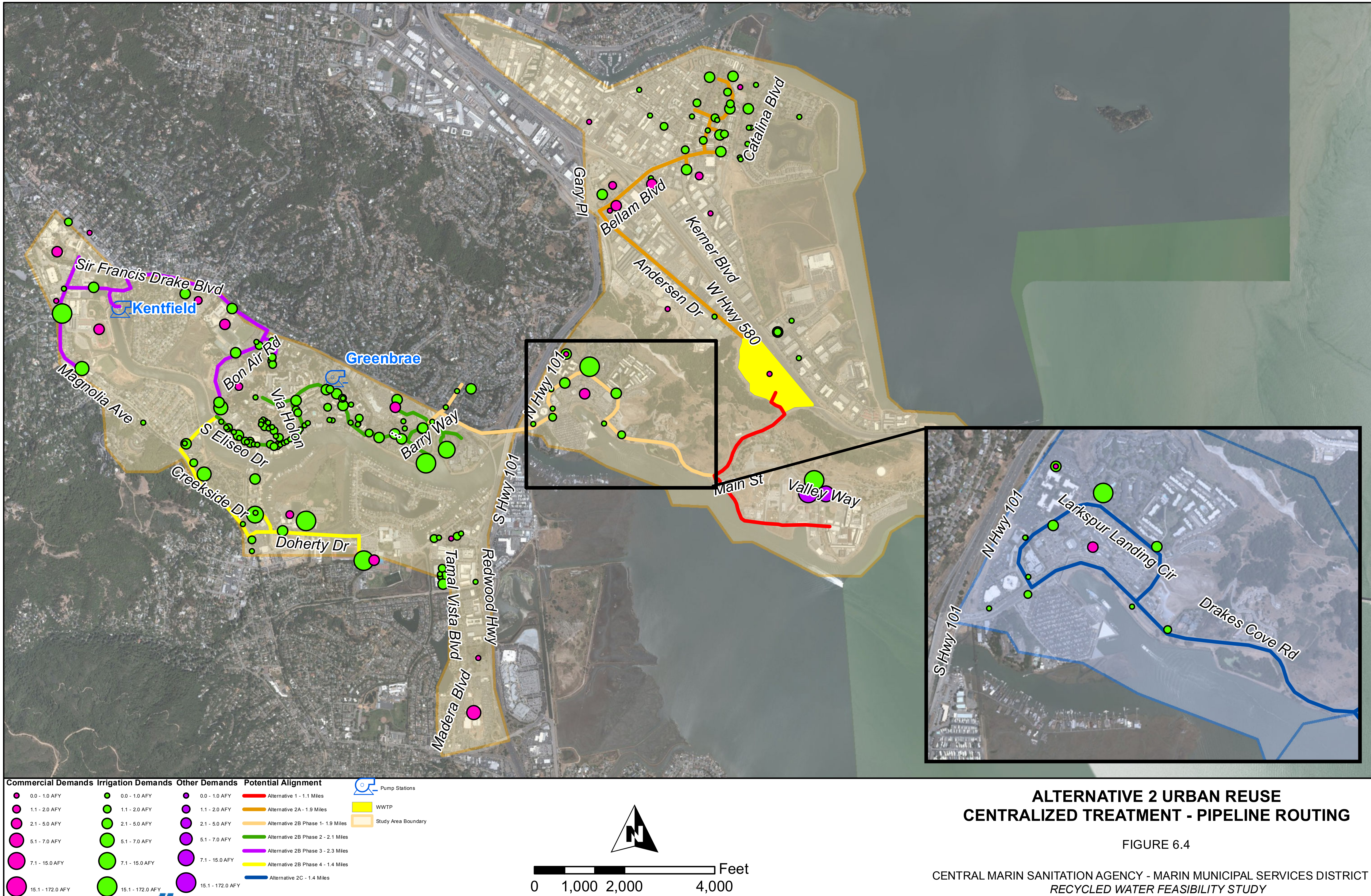
Table 6.7 Alternative 2 – Urban Reuse Centralized Treatment Detail Summary(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

		Estimated Demand		Facilities Needed		
Sub-Alt	**Alt. Name**	**Annual, AFY**	**Max Day(2), mgd**	**Pipeline Length, ft**	**Operational Storage, gallons**	**Pump Station Capacity, hp**
2A	CMSA North	44	0.11	10,000	74,200	33
2B - Phase 1	Marin Country Mart	39	0.11	9,700	71,900	35
2B - Phase 2	Greenbrae	106	0.30	11,100	199,700	147
2B - Phase 3	Kentfield	81	0.22	12,100	144,300	88
2B - Phase 4	Doherty Drive	113	0.32	7,400	212,100	85
2C	Marin Country Mart Only	35	0.09	7,400	62,100	29

Notes:
(1) Tertiary treatment for all alternatives would include MF/RO + UV.
(2) MDD used for sizing of treatment facilities.

6.2.3 Alternative 3 - Urban Reuse – Satellite Treatment

Because of the high level of treatment (MF/RO) required in Alternative 2 to reduce the salinity in the wastewater effluent as well as the relatively long distance between some of the sub-areas and the CMSA WWTP facility, satellite treatment was considered for the three sub-areas that are in the Ross Valley Sanitation District (RVSD): Kentfield, Greenbrae and Doherty Drive.



ALTERNATIVE 2 URBAN REUSE
CENTRALIZED TREATMENT - PIPELINE ROUTING

FIGURE 6.4

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Satellite treatment consists of drawing untreated wastewater from the collection system at the outlet of a lift station and using a small package treatment facility to treat to tertiary levels. A satellite package facility would include MBR for secondary and tertiary treatment followed by UV for disinfection. The solids are then put back into the underlying collection system and conveyed to the CMSA WWTP.

Satellite treatment was considered for this alternative at two of the RVSD's collection system lift stations: Kentfield and Greenbrae. As an added benefit, the wastewater at these particular lift stations is projected to have much less saltwater intrusion and thus, lower levels of salinity. Salinity levels are low enough that additional RO treatment would likely not be needed (CMSA Salt Water Reduction Study, CDM 1993). If this alternative is chosen, salinity levels should be verified.

A third lift station, Larkspur Pump Station, was also considered to draw from for a satellite facility. However, the salinity from this pump station appears to be significantly higher than that of either Kentfield or Greenbrae. Because satellite treatment is often more costly than conventional treatment, addition of RO for salinity reduction would only increase the cost rendering this alternative too expensive. Though the potential routing is detailed further herein, this sub-alternative is not carried forward.

Alternatives 3A to 3C include the entire sub-area of potential RW users as identified in Chapter 5. Alternatives 3D and 3F contain a smaller subset of users considered in an attempt to improve overall cost effectiveness of these sub-alternatives. Each sub-alternative is described in further detail herein.

6.2.3.1 Alternative 3A – Kentfield Area

The pipe routing for this alternative is identical to the pipe routing in Alternative 2B - Phase 3. However, for this satellite treatment option, RW would be fed from the Kentfield pump station. This pump station is located across the creek from A E Kent Middle School near to the Stadium Avenue foot bridge.

6.2.3.2 Alternative 3B – Greenbrae Area

The pipe routing for this alternative is identical to the pipe routing in Alternative 2B - Phase 2. However, for this satellite treatment option, RW would be fed from the Greenbrae pump station. This pump station is located near the intersection of Corte Encanto and El Portal Drive.

6.2.3.3 Alternative 3C – Doherty Drive

This alternative could be built onto either Alternative 3A or 3B and be fed from either the Kentfield or Greenbrae pump station. The routing for this alternative is identical to the pipe routing in Alternative 2B - Phase 4.

6.2.3.4 Alternative 3D – Kentfield Select

In an attempt to lower the cost of the satellite treatment options, a select set of potential RW users were chosen near the Kentfield pump station. These RW users were chosen to maximize RW supplied and minimize piping. The proposed pipe route for Alternative 3D - Kentfield Select routes RW piping across the Stadium Avenue footbridge and then turns left onto College Avenue, terminating when College Avenue becomes Magnolia Avenue.

6.2.3.5 Alternative 3E – Greenbrae Select

Similarly to Alternative 3D, this alternative was created to increase cost effectiveness by minimizing required piping and maximizing RW use near the Greenbrae pump station. The proposed pipe routing is essentially the western portion of Alternative 3B (Greenbrae Area). The proposed pipe routing follows Via Casitas to Upper Via Casitas and then to S Eliseo Drive. The piping then turns onto Laderman Lane and terminates just east of Niven Park.

6.2.3.6 Alternative 3F – Doherty Drive Select

A select set of potential RW users was also considered from the users identified in Alternative 3C (Doherty Drive). However, unlike Alternative 3C, these users would be fed from the Larkspur pump station. This pump station is located near Hall Middle School. While this was an alternative initially considered, as mentioned above, this alternative was not carried forward due to the high salinity expected at the Larkspur pump station.

6.2.3.7 Alternative 3 – Detail Summary

Major components for this alternative include:

- Satellite Treatment – at either the Kentfield or Greenbrae lift stations located within the RVSD collection system.
- Recycled Water Pump Station located at satellite treatment facility.
- Operational Storage located at the satellite treatment facility.
- Distribution Pipeline, routing as proposed, for the 5 separate sub-areas.

Table 6.8 summarizes the details of the sub-alternatives for Alternative 3 – Urban Reuse with Satellite Treatment and Figures 6.5 and 6.6 illustrate the proposed location and pipeline routings for these sub-alternatives.

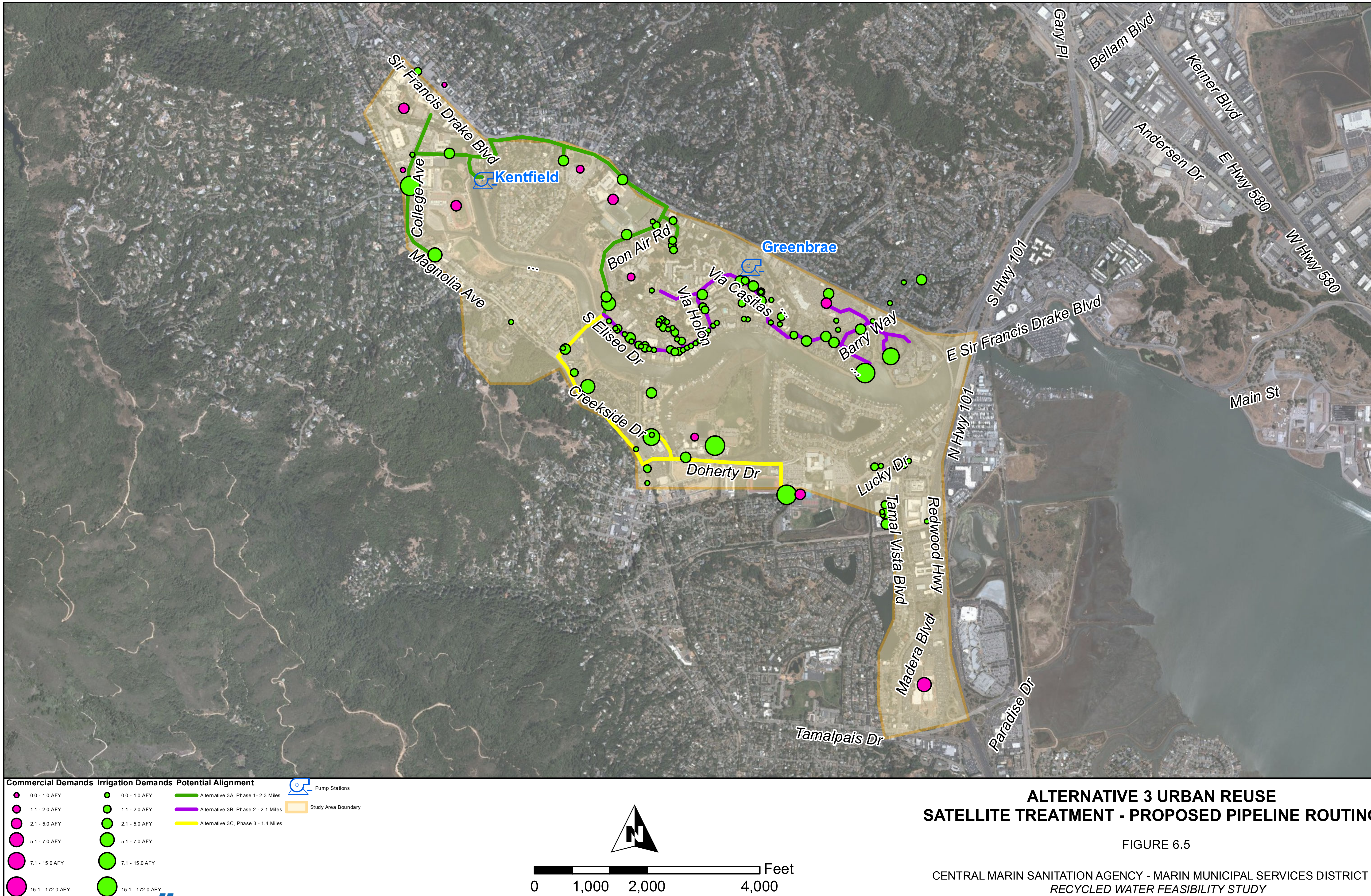
6.2.4 Alternative 4 – DPR

Urban reuse through landscape irrigation and/or commercial reuse, like the alternatives already considered, provides a substitute for potable water use. However, these alternatives are dependent upon the demand present and require significant infrastructure to convey the recycled water to its end user, resulting in high costs and energy use. An alternative method of providing a potable water offset would be through DPR.

Table 6.8 Alternative 3 – Urban Reuse Satellite Treatment Detail Summary(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

			Estimated Demand		Facilities Needed		
Sub-Alt	**Alt. Name**	**Treatment Location**	**Annual, AFY**	**Max Day(2), mgd**	**Pipeline Length, ft**	**Operational Storage, gallons**	**Pump Station Capacity, hp**
3A	Kentfield Area	Kentfield PS	81	0.22	12100	144300	88
3B	Greenbrae Area	Greenbrae PS	106	0.30	11100	199700	147
3C(3)	Doherty Drive	Kentfield PS or Greenbrae PS	113	0.32	7400	212100	85
3D	Kentfield Select	Kentfield PS	42	0.12	3700	77100	25
3E	Greenbrae Select	Greenbrae PS	49	0.14	4700	92600	52

Notes:
(1) Treatment for all alternatives would include MBR followed by UV.
(2) MDD used for sizing of treatment facilities.
(3) This Sub-Alternative would need to be a second phase to either Alternative 3A or 3B.



ALTERNATIVE 3 URBAN REUSE
SATELLITE TREATMENT - PROPOSED PIPELINE ROUTING

FIGURE 6.5

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Commercial Demands	Irrigation Demands
0.0 - 1.0 AFY	0.0 - 1.0 AFY
1.1 - 2.0 AFY	1.1 - 2.0 AFY
2.1 - 5.0 AFY	2.1 - 5.0 AFY
5.1 - 7.0 AFY	5.1 - 7.0 AFY
7.1 - 15.0 AFY	7.1 - 15.0 AFY
15.1 - 172.0 AFY	15.1 - 172.0 AFY

Alternative 3D (Kentfield Select) 0.7 Miles
Alternative 3E (Greenbrae Select), 0.9 Miles
Pump Stations
Potential Customers
Study Area Boundary

N

0 300 600 1,200 Feet

carollo

ALTERNATIVE 3 URBAN REUSE SATELLITE TREATMENT
PROPOSED PIPELINE ROUTING FOR SELECT ALTERNATIVES

FIGURE 6.6

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

As described in Section 6.1.3.4 above, DPR would use RW directly as a water supply without an environmental buffer such as a large reservoir or the groundwater basin. Highly treated recycled water would be injected directly into the water supply system, thus increasing the potable water resources.

For purposes of this alternatives analysis, it was assumed that the connection point into the MMWD potable water system would be a new storage tank located slightly northwest of the CMSA WWTP adjacent to Highway 101 as shown in Figure 6.7. This storage tank currently does not exist but was proposed by MMWD as a possible connection location. Cost for constructing this storage tank is not included in this alternative. This proposed storage tank offers the most feasible point of entrance into the water system.

The FAT brine (or residual) water would be discharged into the existing outfall. Because the existing discharge goes out into the Bay, it is assumed that the addition of a relatively small flow of high TDS water will not be a significant issue. Regardless, the regulatory requirements of this would need to be explored further.

Three different DPR alternatives were considered. Each of the three is described in more detail herein.

6.2.4.1 Alternative 4A – DPR San Quentin

One initial alternative considered would be to supply only San Quentin Prison with DPR. Since San Quentin is close to the CMSA WWTP and has a relatively high, geographically concentrated demand, this alternative could be quite cost effective.

6.2.4.2 Alternative 4B – DPR 2

Another alternative considered would be to produce 2 mgd of recycled DPR water for supplying MMWD's water supply system. This intermediate amount of RW could easily be blended into MMWD's water supply system and would help supplement water use for all MMWD users in the immediate area of San Quentin and the CMSA WWTP.

6.2.4.3 Alternative 4C – DPR 5

The final DPR alternative considered would be to produce 5 mgd of recycled DPR water for supplying MMWD's water supply system. This alternative is identical to the 2 mgd option, except with a large volume of RW for blending into MMWD's existing system. Currently flows at CMSA are not large enough to support this alternative.

6.2.4.4 Alternative 4 – Detail Summary

The major infrastructure components of this alternative include the following:

- FAT treatment facility, including effluent holding tanks.
- Conveyance piping to send FAT product water to MMWD storage tanks.
- FAT product water pump station.

Legend

- On-Site DPR
- Proposed DPR Tank Location
- Pipeline Routing from CMSA WWTP to DPR Tank, 0.9 Miles
- CMSA WWTP

N

0 200 400 800 Feet

ALTERNATIVE 4 - DPR TREATMENT AND CONVEYANCE FACILITIES

FIGURE 6.7

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

carollo

Table 6.9 summarizes the details of the sub-alternatives for Alternative 4 – Direct Potable Reuse and Figure 6.7 illustrates the proposed treatment location and proposed conveyance and injection point into the potable system for this alternative.

Table 6.9 Alternative 4 – DPR Detail Summary
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

	Alt 4A – DPR San Quentin	Alt 4B – DPR 2	Alt 4C – DPR 5
Treatment	0.7 (input)	2.8 (input)	7.0 (input)
MF Capacity, mgd	0.6	2.5	6.3
RO/AOP Capacity, mgd	0.5	2.0	5.0
Brine, mgd	0.1	0.5	1.3
RO Product Water Holding Tanks	3 tanks @ 12 hours detention time		
Infrastructure			
Conveyance Piping, lf	5,500	5,500	5,500
Pumping, gpm	460	1,400	3,500
Horsepower (HP)	10	170	350

6.3 INITIAL SCREENING OF ALTERNATIVES

An economic comparison was conducted to ‘pre-screen’ the various sub-alternatives within the four (4) main alternatives. Planning level costs were developed based upon the preliminary layouts, capacities and basis of costs summarized in the previous sections.

6.3.1 San Quentin Prison

Table 6.10 summarizes the preliminary cost estimates for the San Quentin Prison sub-alternatives. Given the close proximity of the prison to the CMSA WWTP, the cost effectiveness, as determined by the unit cost of recycled water delivered, of each of these alternatives is reasonable. Alternative 1B, though higher in cost than Alternative 1A, would provide CMSA with the flexibility of expanding their recycled water service in the future to serve other users outside of the prison by offering pre-treatment for RO. Alternative 1C, the highest cost San Quentin Prison alternative, should be considered if both a San Quentin Prison and other Centralized Treatment alternative were to be built simultaneously.

Table 6.10 Alternative 1 - Economic Comparison of SQP Alternatives[1] Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District					
Alt. No.	**Alt. Name**	**Capital Cost, $M**	**Project Cost, $M[2]**	**Annual Cost, $M/year[3]**	**Unit Cost per AF**
1A	SQP – Conventional	$5,270,000	$6,590,000	$381,000	$2,490
1B	SQP - MF	$6,820,000	$8,530,000[4]	$447,000	$2,920[4]
1C	SQP - MF/RO	$8,230,000	$10,310,000	$529,000	$3,440

Notes:
(1) Based on ENRCCI_SF of 11,155 (July 2015).
(2) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(3) Includes O&M Cost and annualized project cost (discounted at 1% over a 30 year period).
(4) If instead of chlorine disinfection UV disinfection is used the Project Cost is $8.75 million and the unit cost per acre foot is $3,000.

6.3.2 Urban Reuse – Centralized Treatment

Table 6.11 summarizes the preliminary cost estimates for the Urban Reuse – Centralized Treatment sub-alternatives. Based on the costs presented in Table 6.11, Alternative 2A and 2C require a significant amount of conveyance piping but have no large, anchor customers to drive down the unit cost. Alternative 2B also requires a significant amount of conveyance from the centralized treatment location and though many of the phases in this alternative have higher demands than 2A and 2C, the unit costs of these phases remain relatively high. Therefore, these three alternatives were not considered further in this analysis.

6.3.3 Urban Reuse – Satellite Treatment

Table 6.12 summarizes the preliminary cost estimates for the Urban Reuse – Satellite Treatment sub-alternatives. Based on the costs presented in Table 6.12, Alternatives 3A, 3B and 3C have a high initial project cost as well as a high unit cost for RW delivered. The costs are largely attributable to both the package treatment system as well as the amount of conveyance associated with each of these alternatives.

Alternatives 3D and 3E have lower initial project costs attributable to less conveyance and smaller treatment systems. However, because the demands for these smaller alternatives are also reduced, the unit costs are not significantly different than the first three alternatives. Though Alternatives 3D and 3E have high unit costs, they will be carried forward while Sub-Alternatives 3A, 3B and 3C were eliminated from further evaluation.

Table 6.11 Alternative 2 - Economic Comparison of Urban Reuse – Centralized Treatment Alternatives(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt. Name	Capital Cost, $M	Project Cost, $M(2)	Annual Cost, $M/year(3)	Unit Cost per AF
2A	CMSA North	$5,470,000	$6,840,000	$393,000	$8,910
2B - Phase 1	Marin Country Mart	$6,010,000	$7,510,000	$416,000	$10,710
2B - Phase 2	Greenbrae	$12,510,000	$15,640,000	$759,000	$7,180
2B - Phase 3	Kentfield	$9,200,000	$11,500,000	$587,000	$7,280
2B - Phase 4	Doherty Drive	$10,780,000	$13,480,000	$656,000	$5,800
2C	Marin Country Mart Only	$4,230,000	$5,290,000	$320,000	$9,480

Notes:
(1) Based on ENRCCI_SF of 11,155 (July 2015).
(2) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(3) Includes O&M Cost and annualized project cost (discounted at 1% over a 30 year period).

Table 6.12 Alternative 3 - Economic Comparison of Urban Reuse – Satellite Treatment Alternatives(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt. Name	Capital Cost, $M	Project Cost, $M(2)	Annual Cost, $M/year(3)	Unit Cost per AF
3A	Kentfield Area	$9,710,000	$12,140,000	$590,000	$7,320
3B	Greenbrae Area	$12,620,000	$15,780,000	$750,000	$7,100
3C(4)	Doherty Area	$11,540,000	$14,430,000	$691,000	$6,110
3D	Kentfield Select	$4,250,000	$5,310,000	$297,000	$7,130
3E	Greenbrae Select	$5,490,000	$6,860,000	$367,000	$7,570

Notes:
(1) Based on ENRCCI_SF of 11,155 (July 2015).
(2) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(3) Includes O&M Cost and annualized project cost (discounted at 1% over a 30 year period).
(4) This sub-alternative would need to be considered as a phase 2 to either sub-alternative 3A or 3B.

6.3.4 DPR

Table 6.13 summarizes the preliminary cost estimates for the DPR sub-alternatives. Based on the costs presented in Table 6.13, it is apparent that the size of the DPR facility impacts the overall project cost with a dramatic increase between Alternative 4A and 4C; however, the unit cost for each of these alternatives is relatively the same. There was concern about the approval process of DPR serving only the prison from a social justice perspective and therefore, this sub-alternative was not carried forward. Additionally, at this time CMSA does not produce enough effluent to support Alternative 4C.

Because the potable needs in this area are not well-known at this time, Sub-Alternative 4B was carried forward for further review, but Table 6.13 offers a reference for DPR costs based on capacity should more specific demand information become available in the future.

Table 6.13 Alternative 4 - Economic Comparison of DPR Alternatives(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt. Name	Capital Cost, $M	Project Cost, $M(2)	Annual Cost, $M/year(3)	Unit Cost per AF
4A	SQP Only	$10,370,000	$13,480,000	$810,000	$1,220
4B	DPR - 2	$33,350,000	$43,360,000	$2,874,000	$1,270
4C	DPR - 5	$67,890,000	$88,260,000	$6,354,000	$1,100

Notes:
(1) Based on ENRCCI_SF of 11,155 (July 2015).
(2) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(3) Includes O&M Cost and annualized project cost (discounted at 1% over a 30 year period).

6.4 NO PROJECT ALTERNATIVE

In the event that a recycled water project does not move forward for CMSA, no recycled water would be produced at the CMSA WWTP to offset potable demand.

Though the use of recycled water within the CMSA service area would provide a sustainable water supply for South Marin and would add resiliency to the MMWD system, MMWD is hydraulically capable and of adequate size to provide the potable water necessary to meet projected demand even in drought conditions, as have been experienced recently.

6.5 PREFERRED ALTERNATIVE SUMMARY

After the initial evaluation of sub-alternatives on the basis of costs and implementation, the resulting preferred alternatives are summarized in Table 6.14, which compares the quantitative parameters upon which these alternatives are compared and evaluated further.

Table 6.14	Summary of Preferred Alternatives – Basis of Alternatives Comparison Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District						
		Demand/Capacity		Facilities Needed			
					Infrastructure		
Alt. No.	**Alt Name**	**Recycled Water Delivered, AFY**	**Treatment / Distribution System Capacity, mgd**	**Treatment**	**Pipeline, ft**	**Pumping, HP**	**Storage, MG**
1A	SQP - Conventional	154	0.20	CBW + Chlorine	5,800	50	0.09
1B	SQP - MF	154	0.20	MF + Chlorine	5,800	50	0.09
1C	SQP - MF/RO	154	0.20	MF/RO + UV	5,800	50	0.09
3D	Kentfield Select	42	0.12	MBR + UV	3,696	25	0.08
3E	Greenbrae Select	49	0.14	MBR + UV	4,752	52	0.09
4B	DPR - 2	2,260	2	FAT	5,500	170	3.0

The economic comparison of the remaining preferred alternatives is shown in Table 6.15 (detailed estimate included in Appendix I) and a qualitative comparison of the alternatives is presented in Table 6.16. This qualitative summary compares each alternative with the overall project objectives and the relative ease of implementation and operation.

6.6 PREFERRED ALTERNATIVES SCREENING

The preferred alternatives screening was conducted to assess further the economic and non-economic consideration of the remaining preferred alternatives. The intent of the alternatives screening process was to identify those projects that maximize water supply opportunities and those that are most likely to be implemented.

The four (4) centralized treatment urban reuse, two (2) satellite treatment urban reuse and one (1) DPR alternatives were screened in the screening process presented below.

6.6.1 Screening Criteria and Process

Screening criteria were developed that were relevant to the overall project objectives and to the general considerations for implementation and application of the alternatives. The criteria used to evaluate all of the conceptual alternatives are as follows:

- Cost – relative cost of constructing and operating.
- Cost Sharing – the likelihood of being able to share the construction/implementation costs with another entity (e.g., MMWD).
- Energy Use - the relative energy consumption required to operate each alternative.
- Regulatory – relative ease and acceptance of regulators to permit the process.
- Potable Water Offset – relative amount of potable offset achievable.
- Public Acceptance – level of acceptance of process by the public.
- Ability to Phase – ease with which an alternative could be constructed/implemented in phases.
- Constructability – relative ease of constructing alternative within the existing infrastructure (e.g., roads, utilities, buildings).
- Ease of Implementation/Operability – relative ease of implementing, constructing and operating the facility.
- Administrative Ease – difficulty or ease of administering the recycled water system depending upon the number of customers involved (i.e., serving a single large customer would be simpler than several smaller customers).

Table 6.15	Economic Comparison of Preferred Alternatives[1,2] Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Alt. No.	**Alt. Name**	**Capital Cost, $M**	**Project Cost, $M[3]**	**Annual Cost, $M/year[4]**	**Unit Cost per AF of Net Potable Offset**
1A	SQP – Conventional	$5,270,000	$6,590,000	$381,000	$2,490
1B	SQP – MF	$6,820,000	$8,530,000[5]	$447,000	$2,920[5]
1C	SQP – MF/RO	$8,250,000	$10,310,000	$529,000	$3,440
3D	Kentfield Select	$4,250,000	$5,310,000	$297,000	$7,130
3E	Greenbrae Select	$5,490,000	$6,860,000	$367,000	$7,570
4B	DPR – 2	$33,350,000	$43,360,000	$2,874,000	$1,270

Notes:
(1) Based on ENRCCI_SF of 11,155 (July 2015).
(2) The costs presented above are for new facilities to meet the demands listed.
(3) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(4) Includes O&M Cost and annualized project cost (discounted at 1% over a 30 year period).
(5) If instead of chlorine disinfection UV disinfection is used the Project Cost is $8.75 million and the unit cost per acre foot is $3,000.

Table 6.16 Qualitative Summary of Preferred Alternatives
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Alt. No.	Alt. Name	Regulatory Acceptance	Potable Water Offset/Reliability	Constructability/Public Acceptance	Ability to Phase	Implementation/ Operability
1A	SQP - Conventional	Title 22 facilities relatively easy to permit	Yes	Some construction along Sir Francis Drake Blvd (busy arterial) and San Quentin Prison	Limited to RW use at SQP only	Would require close coordination with SQP
1B	SQP - MF	Title 22 facilities relatively easy to permit	Yes	Some construction along Sir Francis Drake Blvd (busy arterial) and San Quentin Prison	Provides initial infrastructure for possible future RW expansion to other users	Would require close coordination with SQP
1C	SQP - MF/RO	Title 22 facilities relatively easy to permit	Yes	Some construction along Sir Francis Drake Blvd (busy arterial) and San Quentin Prison	Provides all infrastructure needed for future RW expansion to other users	Would require close coordination with SQP
3D	Kentfield Select	Off-Site Package Plant for secondary /Tertiary Treatment	Yes	Construction around a school and along a footbridge	None	Treatment in two locations
3E	Greenbrae Select	Off-Site Package Plant for secondary /Tertiary Treatment	Yes	Locating space for a package facility challenging; may be in residential neighborhood	None	Treatment in two locations
4B	DPR - 2	Permitted on a case-by-case basis until regs promulgated in 2016	Yes	Public acceptance is increasing as DPR becomes a more viable option. Depending on the facility size, there may be space concerns.	Yes – because of modular nature	New operational training required for new treatment processes

An initial screening of each of the preferred alternatives was developed where each of the alternatives were evaluated against the above screening criteria and assigned a value on a scale of 1 to 10, with 10 being the 'best' fit relative to the criteria and 1 being the 'worst'. The summation of the criteria values for each alternative provided an overall score. Those overall scores then provided the ranking for the various alternatives relative to each other.

6.6.2 Screening Discussion

Table 6.17 presents the screening evaluation of the preferred alternatives. Further discussion of the factors that led to the screening evaluation results are included below.

6.7 RECOMMENDED PROJECT

Based upon the above evaluations, the Recommended Project is Alternative 1B. This project will include the addition of microfiltration and the modification of existing chlorine contact tanks for recycled water disinfection at the CMSA WWTP. A new recycled water pump station and operational storage located at the CMSA WWTP as well as piping to San Quentin Prison will also be included with this project. A retrofit of the existing partially dual plumbed facilities at San Quentin's North, East, South, and West Blocks makes up the final component of this project. At this point in time, it is assumed that San Quentin will provide any additional salinity reduction treatment required onsite for recycled water use for their irrigation, boiler, and car washing needs. However, the timing and location of RO treatment implementation should be looked into as a next step. This recommended project also includes providing recycled water to the commercial truck filling station currently constructed at CMSA. However, because salinity reduction will not be provided at CMSA with this Recommended Project the second identified O&M use, namely Marin Sanitary Service, is not included in this project. Based on previous experience taking high salinity water, Marin Sanitary Service is only interested in low salinity water to protect their trucks from corrosion.

Chapter 7 will include further details of the Recommended Project. Funding sources and financing of these projects are explored further in Chapter 8.

Table 6.17 Screening of Preferred Alternatives[1]
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

	Economic			Implementation Considerations							
Alt	**Cost[2]**	**Cost Sharing**	**Energy Use**	**Reg Acceptance**	**Potable Offset**	**Public Acceptance**	**Ability to Phase**	**Constructability**	**Ease of Implement**	**Admin Ease**	**Total Score**
1A – SQP - Conventional	8	8	7	9	8	8	1	9	8	9	**75**
1B – SQP - MF	7	8	7	9	8	8	8	8	7	9	**80**
1C - SQP - MF/RO	6	8	5	9	8	8	9	7	7	9	**76**
3D – Kentfield Select	1	2	6	7	3	6	1	4	6	8	**44**
3E – Greenbrae Select	1	2	6	7	3	6	1	4	6	7	**43**
4B – DPR-2	10	8	2	6	10	5	9	4	1	9	**64**

Notes:
(1) Scoring from 1 to 10 with 10 being the 'best'.
(2) This was screened based on the unit cost of the alternatives ($ per AF) rather than the total annual cost.

RECOMMENDED PROJECT ALTERNATIVE

7.1 RECOMMENDED PROJECT

The recommended project for the CMSA Recycled Water Feasibility Study is the Alternative 1B – San Quentin Prison with MF Treatment to provide RW to uses at San Quentin Prison. The Recommended Project includes a retrofit of existing partially dual plumbed facilities at San Quentin's North, South, East, and West Blocks as well as the construction of treatment (filtration and disinfection) and distribution facilities at CMSA. A new effluent pump station would be placed near the treatment facility as well. The recommended project was estimated to be the most cost effective approach for adding RW use within the CMSA service area at this current time.

7.1.1 Potential Customers and Pipeline Alignment

The potential RW customers and pipeline alignment included in the Recommended Project are presented in Figure 7.1. Table 7.1 includes a summary of the customers included in the Recommended Project along with their average annual demands. A new 6-inch, pipeline, 5,808 feet in length, would be constructed south along Sir Francis Drake Boulevard, and then east along Levee Road to the San Quentin Prison. Only one of the two identified O&M uses, namely CMSA's commercial truck filling station, will be served by this Recommended Project. MSS was not included due to the salinity levels in the RW.

Table 7.1 Customers included in the Recommended Project
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Customers	Average Annual Demand, AFY
San Quentin Uses	
Landscape Irrigation(1)	16.4
Boiler Make-up Water	14.3
Dual Plumbing in North, South, East, and West Blocks	121.7
Car Wash(1)	0.1
Other Uses at CMSA	
CMSA commercial truck filling station	0.5
Total Recycled Water Use	**154**

Note:
(1) Due to the current drought SQP is currently not irrigation or using water to wash cars.

7.1.2 Pump Station Sizing

A single pump station at the CMSA WWTP is included in the alignment as shown in Figure 7.1. The RW pump station will supply RW to the distribution system from a new RW operational storage tank, sized to offset peak hour demand. Recommended sizing for this pump station is presented in Table 7.2.

Because the elevation difference between the CMSA WWTP and the end user along the Recommended Project Alignment is only 36 feet, the pump station will pump a Total Dynamic Head (TDH) of approximately 190 feet, requiring 50 horsepower (HP).

7.1.3 Storage Sizing

The current ADW flow of the CMSA WWTP is 4.7 mgd while the MDD for the Recommended Project is only 0.20 mgd. Thus, no equalization storage prior to the RW facilities will be needed.

Approximately 76,000 gallons of operational storage is required to supply the remaining 150 gpm of peak hour flows (290 gpm peak hour – 140 gpm tertiary facility capacity) for 8 hours. The proposed CMSA recycled water storage tank is sized for that capacity.

7.1.4 Tertiary Treatment

Based on the tertiary treatment evaluation presented in Chapter 6, microfiltration followed by chlorine disinfection is the recommended tertiary treatment process. The system is sized for a capacity of 140 gpm with the operational storage providing the remaining peak hour of 150 gpm for a total of 290 gpm. Microfiltration filters are sized such that the hydraulic loading rate is under 5 gpm / sf at the maximum flow, per Title 22 requirements for tertiary filtration. A minimum CT value of 450 milligram-minutes per liter and a minimum modal contact time of 90 minutes is assumed for sizing the chlorine contact tank retrofit system downstream of the filter, again per Title 22 requirements. This should be re-evaluated during preliminary design to more closely match the expected effluent water quality.

Figure 7.2 shows the proposed location of the treatment facility.

7.2 RECOMMENDED PROJECT COST ESTIMATE

Table 7.3 presents a summary of the Recommended Project Costs including the project components as described above.

Legend

- Dual Plumbing and Boiler Piping
- CMSA
- San Quentin Prison

N

0 300 600 1,200 Feet

carollo

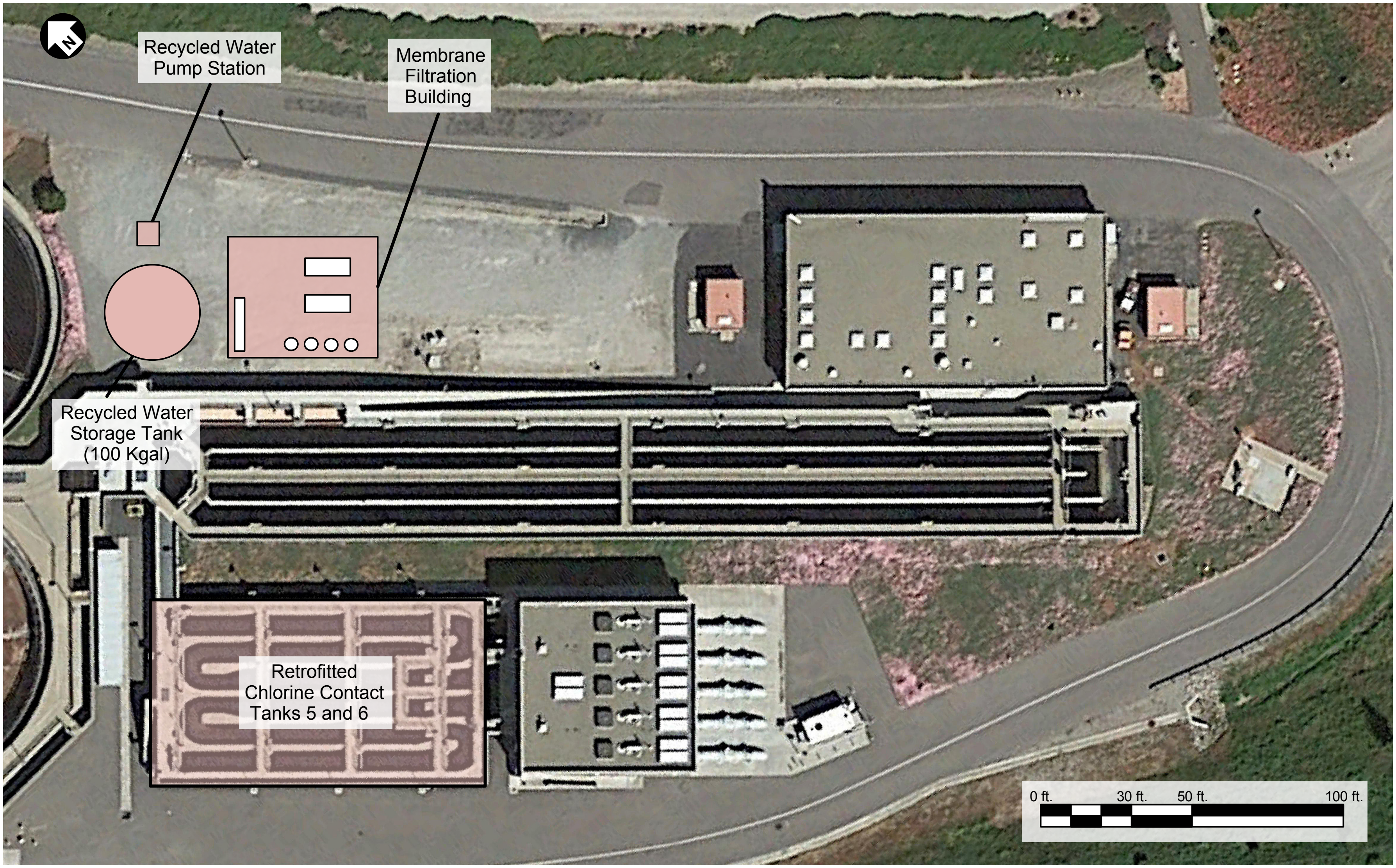
RECOMMENDED PROJECT
PROPOSED PIPELINE ROUTING

FIGURE 7.1

CENTRAL MARIN SANITATION AGENCY - MARIN MUNICIPAL SERVICES DISTRICT
RECYCLED WATER FEASIBILITY STUDY

Table 7.2	**Recommended Recycled Water System Design Conditions and Criteria(1)** **Recycled Water Feasibility Study** **Central Marin Sanitation Agency/Marin Municipal Water District**
Description	**Criteria**
Design Demand	
Supply Source	CMSA
Average Annual RW Demand	154 AFY
Maximum Day RW Demand	0.20 mgd
Peak Hour RW Demand	290 gpm
Tertiary Treatment	
Filtration	
No. of Units	1
Membrane Area, sf	50
Loading Rate @ maximum flow, gpm/sf	2.8
Chlorine Disinfection (Retrofit)(2)	
Dose, mg/L	3-5
Contact Time, minutes (Max Day Flow)	2424
Distribution System Criteria (New Users Only)	
Pipeline Size, in	6
Pipeline Length, lf	3,800
Maximum System Pressure	90 psi
Minimum System Pressure	50 psi
Maximum Pipeline Velocity	7 ft/sec
Maximum Pipeline Headloss	7 ft/1,000 ft
Pipeline Roughness (C Factor)	130
Pump Station Criteria	
Flow (PHD)	290 gpm
Total Dynamic Head	190 ft.
No. of Pumps	2 duty + 1 standby
Type	Split Case-Centrifugal
Power (duty)	50 HP
Storage Criteria	
Storage	75,600 gal
Usage Schedule	
Dual Plumbing Schedule	High Use: 6 AM to 9 AM and 5 PM to 8 PM Lower Use: Remaining Hours
Boiler Schedule	All Day
Landscape Irrigation Schedule	10 PM to 6 AM
Commercial Schedule	8 AM to 5 PM

Notes:
(1) These Design Criteria are preliminary and should be further refined if this project moves forward.
(2) Contact Time and Dose meet the required 450 mg-min/L effluent limit.



RECOMMENDED PROJECT - TERTIARY TREATMENT PROPOSED LAYOUT

FIGURE 7.2

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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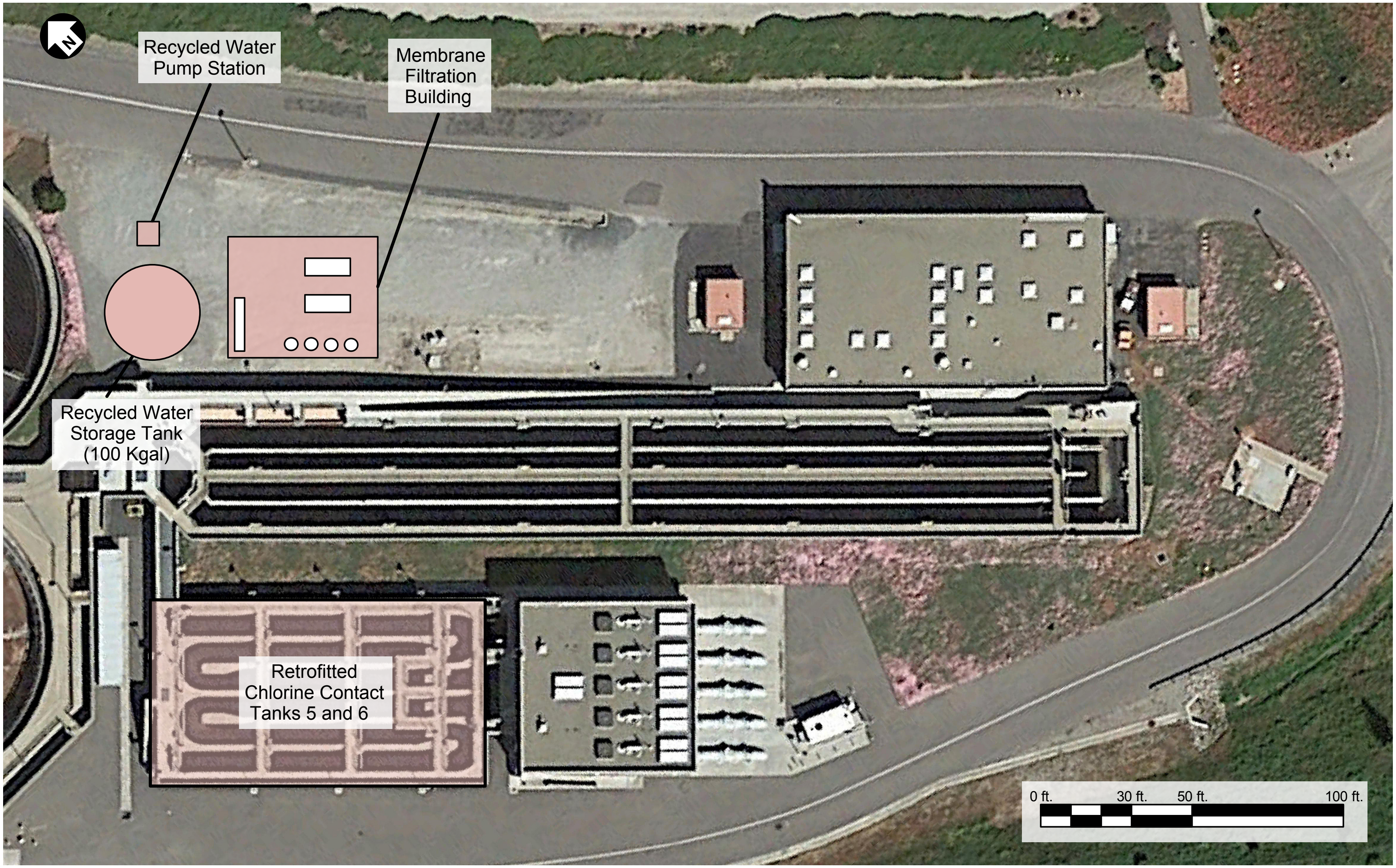

RECOMMENDED PROJECT - TERTIARY TREATMENT PROPOSED LAYOUT

FIGURE 7.2

CENTRAL MARIN SANITATION AGENCY
MARIN MUNICIPAL WATER DISTRICT
RECYCLED WATER FEASIBILITY STUDY

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Table 7.3 Recommended Project Cost Estimate(1)
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Description	Recommended Project Cost
Treatment + Pumping	$3,873,800
Pipeline + Storage(2)	$2,912,000
Connection Fees(3)	$35,000
Total Capital Cost, $	**$6,820,000**
Project Cost Soft Costs(4)	$1,710,000
Total Project Cost, $	**$8,530,000**
Annualized Project Cost, $ / year(5)	$330,000
O&M Cost, $ / year(6)	$117,000
Total Annual Cost, $ / year	**$447,000**
Volume Water Delivered (AFY)	153
Unit Cost per AF	$2,920

Notes:
(1) ENRCCI _SF = 11,155 (July 2015).
(2) Of this pipeline and storage cost approximately $1.7 million is allocated for dual plumbing at the prison.
(3) Based on conversion of commercial customers only (@ a direct cost of $20,000 per customer) plus incidental amount for irrigation customers (@ a direct cost of $5,000 per customer). The cost shown above includes the standard markup. Both a commercial and irrigation connection fee were assumed for connecting to the prison's irrigation and boiler/car washing system, respectively.
(4) Includes Engineering, Legal, Administration and Change Orders (25% of Capital Cost).
(5) Discounted at 1% over a 30 year period.
(6) Includes annual costs for energy, chemical use, equipment maintenance, and labor.

7.3 IMPLEMENTATION PLAN

CMSA along with partnering agencies (MMWD, etc.) will need to address the following project components in implementing the recycled water project (listed in no specific order):

- Design the recommended alternative.
- Receive firm commitments and Agreements from potential customers to use recycled water.
- Obtain permits and clearances from applicable regulatory agencies (RWQCB, CA DDW, etc.). Also includes development of the RW Policy Salt/Nutrient Management Plan (defined in Section 4.1.3) or approval from RWQCB that a plan is not needed to protect groundwater in this area.

- Conduct environmental process (CEQA and/or NEPA if required) and develop compliance documents.
- Determine cost sharing scenarios – capital, O&M, water usage.
- Adopt a resolution for recycled water use.
- Prepare a cost of service rate study.
- Investigate system O&M options.
- Consider cross connection inspection and testing in annual O&M planning

An implementation schedule is outlined in Table 7.4.

Table 7.4 Planned Implementation Schedule
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Item Description	Start Year	End Year
San Quentin Prison Recycled Water		
Planning	2016	2016
Design	2017	2018
Construction	2019	2020

7.3.1 Recycled Water State Policy

The SWRCB recognizes that a burdensome and inconsistent permitting process can impede the implementation of recycled water projects. The SWRCB adopted a Recycled Water Policy in 2009 to establish more uniform requirements for water recycling throughout the State and to streamline the permit application process in most instances.

The newly adopted RW Policy includes a mandate that the State increase the use of recycled water over 2002 levels by at least 200,000 AFY by 2020, and by at least 300,000 AFY by 2030. Also included are goals for stormwater reuse, conservation and potable water offsets by recycled water. The onus for achieving these mandates and goals is placed both on recycled water purveyors and potential users.

Absent unusual circumstances, the RW Policy puts forth that recycled water irrigation projects that meet California DDW requirements and other State or Local regulations, be adopted by Regional Boards within 120 days. These streamlined projects will not be required to include a monitoring component.

CONSTRUCTION FINANCING PLAN AND REVENUE PROGRAM

8.1 FUNDING SOURCES AND CONSIDERATIONS

The adequate funding of capital costs is a primary constraint in implementing any construction project, especially water recycling projects. Recycled water projects can sometimes have some State, Federal, and local funding sources available.

This chapter describes potential funding opportunities and financing mechanisms for capital and operations costs, including an outline of current applicable grants and loan opportunities. The term “funding” refers to the method of collecting funds; the term “financing” refers to methods of addressing cash flow needs.

The recommended recycled water project is attractive for funding agencies for two primary reasons:

- The project provides integrated benefits and meets various objectives:
  - Helps meet State recycled water objectives.
  - Protects surface water resources.
  - Demonstrates regional cooperation.
- The project involves regional partnerships and provides benefits to numerous stakeholders, including: the water district, the wastewater agency, and the local customers (California Department of Corrections & Rehabilitation - San Quentin Prison).

Grants and low interest loans are highly competitive. Competitive funding programs require enhanced recycled water programs to meet as many of the following objectives as possible:

- Regional partnerships.
- Integrated project benefits.
- Water conservation.
- Renewable energy improvements.
- Economic stimulus:
  - Job creation.
  - Job preservation.

8.2 FUNDING SOURCE IDENTIFICATION

Costs of the recycled water project consist of two components – capital cost for construction of distribution facilities and O&M costs of the treatment and distribution systems.

The funding sources available range from traditional funding options such as pay-as-you-go funding, bond funding, grants, and State assisted loans to non-traditional funding sources such as market-based programs. The sections that follow outline the mechanisms available to recover both capital and O&M costs.

The main instruments available for funding the capital costs include:

- Pay-as-you-go financing or upfront collection of project costs from existing and new users for future capital improvement projects.
- Debt financing or the acquisition of funds through borrowing mechanisms.
- Grants and loans or alternate source of funds at no or minimal interest cost. Examples include federal, state, and local programs that provide funding at zero interest for projects that meet select criteria.
- Market-based programs that refer to financing through funds obtained from tax credits, purchase agreements, voluntary programs, trading and offset programs, and public-private partnerships.

All of these funding sources are discussed in additional detail in the following sections.

8.2.1 Pay-As-You-Go Financing

Pay-as-you-go financing involves periodic collection of capital charges or assessments from customers within the utility's jurisdiction for funding future capital improvements. These revenues are accumulated in a capital reserve fund and are used for capital projects in future years. Pay-as-you-go financing can be used to finance 100 percent or only a portion of a given project.

One of the primary advantages of pay-as-you-go financing is that it avoids the transaction costs (e.g., legal fees, underwriters' discounts, etc.,) associated with debt financing alternatives, such as revenue bonds. However, there are two common disadvantages associated with this method. First, dependent on the size of the capital program it may be difficult to raise the required capital within the allowable time. Second, absent a buy-in component to the agency's capacity charge, fully placing the burden of funding a capital program on existing ratepayers may result in generational inequities whereby existing residents would be paying for facilities that would be utilized by, and benefit, future residents. Agencies may account for existing assets in their capacity charges in order to recover a proportionate share of existing system costs from new developments.

8.2.1.1 Utility Fees and Benefit Assessment Fees

Utility fees or benefit assessments can be used to fund recycled water system improvements. CMSA could also implement an assessment through a public voting process, which would recover costs through the annual property taxes. This would be done by CMSA's joint powers satellite collection agencies. Benefit assessment fees are usually included as a separate line item on the annual property tax bill sent to each property owner.

Utility fees are billed on a monthly interval. A utility has the authority to collect a benefit assessment fee, but only after approval by a majority of the voters, affected property owners, or ratepayers.

8.2.1.2 Capacity Charges

CMSA or MMWD may impose a capacity charge on new development in order to recover a proportionate share of providing regional conveyance and treatment facilities to serve new recycled water customers. As recycled water would add to the existing source of supplies, (potable or raw water), this may also be done through existing water capacity charges. A capacity charge is a one-time fee imposed on a new development or upsize in system requirements. They are one-time fees charged to customers at the time of system connection approval or permit/contract issuance. The charges for individual properties may be based on whatever assessment measures desired for equity. CMSA or MMWD may appropriately recover costs through a recycled water capacity charge. As CMSA or MMWD can also demonstrate a cost benefit to wastewater and recycled water users, the agencies may also recover a portion of the system costs through a wastewater or potable water capacity charge.

Capacity charges are collected at the time of permitting for many agencies. Consequently, annual revenues from capacity charges depend solely on the rate of growth of the recycled water system. As such, funds may not be available to construct new facilities at the time it is needed.

8.2.2 Debt Financing

There are several different options for debt financing of recycled water projects, ranging from issuance of short- or long-term bonds.

8.2.2.1 Revenue Bonds

Revenue bonds are historically the principal method of incurring long-term debt. This method of debt obligation requires specific non-tax revenues such as user charges, facility income, and other funds, pledged to guarantee repayment. There is often no legal limitation on the amount of authorized revenue bonds that may be issued, but from a practical standpoint, the size of the issue must be limited to an amount where annual interest and principal payments are well within the revenues available for debt service on the bonds.

Revenue bond covenants generally include coverage provisions, which require that revenue from fees minus operating expenses be greater than debt service costs.

8.2.2.2 <u>Certificates of Participation</u>

Certificates of participation provide long-term financing through a lease agreement that does not require voter approval. The legislative body of the issuing agency is required to approve the lease arrangement by a resolution. The lessee (District) is required to make payments typically from revenues derived from the operation of the facilities. The amount financed may include reserves and capitalized interest for the period that facilities will be under construction. Within the State of California, most municipal water utility bonds are issued in the form of certificates of participation rather than traditional revenue bonds.

8.2.2.3 <u>General Obligation Bonds</u>

General obligation (GO) bonds are municipal securities secured by the issuer's pledge of its full faith, credit, and taxing power. GO bonds are backed by the general taxing authority of local governments and are often repaid using utility revenues when issued in support of a sewer or water enterprise fund. In the event that GO bonds are issued for this project, the agency must have the necessary taxing capacity to issue the bonds.

8.2.2.4 <u>Assessment District Bonds</u>

Financing by this method involves initiating assessment proceedings. Assessment proceedings are documents in "Assessment Acts" and "Bond Acts." An assessment act specifies a procedure for the formation of a district (boundaries), the ordering, and making of an acquisition or improvement, and the levy and confirmation of an assessment secured by liens on land. A bond act provides the procedure for issuance of bonds to represent liens resulting from proceedings taken under an assessment act. Procedural acts include the Municipal Improvements Acts of 1911 and 1913. The commonly used bond acts are the 1911 Act and the Improvement Bond Act of 1915. The procedure most prevalent currently is a combination of the 1913 Improvement Act with the 1915 Bond Act. Charges for debt service can be included as a special assessment on the annual property tax bill. The procedure necessary to establish an assessment district may vary depending on the acts under which it is established and the district size.

8.2.3 Grants and Loans

Grant and loan programs can be utilized to finance the recommended recycled water project alternative. These grants and loans are further discussed as state and federal funding sources in the succeeding sections. Table 8.1 provides a summary of some of the available state and federal funding sources. Please refer to the contact or website for the most up to date information for each of these grants and loans.

There are numerous factors that should be considered in the pursuance of grant funding. Several factors that should be noted in pursuance of grant funding include:

Table 8.1 Funding Summary
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Program	Agency	Type	Description
State			
Water Recycling Funding Program	State Water Resources and Control Board	Grant/Loan	Funding is available for projects in the following categories: 1. Category I projects will offset state water supplies and increase water to the Delta. 2. Category II projects will offset state water use, but do not provide benefits to the Delta. 3. Category III projects use recycled water to supplement local water supplies but have no impact on the state water supply or the Delta. 4. Category IV projects will treat and reuse groundwater contaminated by human activity. 5. Category V projects will treat and dispose wastewater to meet waste discharge regulations. 6. Category VI captures miscellaneous projects that do not fall into other categories and have no benefits to state or local water supplies. The maximum award for construction grants for Category I through IV projects is the lesser value of $5 million per project or 25 percent of construction costs. Category V and VI projects are only eligible for SRF loans. Loans are capped at $50 million per agency per year.
Integrated Regional Water Management Grants Program (Prop 84)	Department of Water Resources	Grants	Grants are available for projects that support integrated water resources management (IWRM) plans and are related to water supply reliability, groundwater recharge, water quality enhancement etc.
Proposition 1	State Water Resources Control Board	Grants	Funding is available for recycled water projects. Program is being run through the SRF program (application is same as an SRF application). Grant award is up to 35 percent of construction costs or a maximum of $15 million. Funds are available on a first-come, first serve basis.
Federal			
Title XVI	U.S. Bureau of Reclamation	Grants	Eligible projects include recycled water feasibility, demonstration, and construction projects. The program provides as much as 25 percent of construction costs with a maximum of $20 million. To meet eligibility requirements a project must have a Bureau of Reclamation approved feasibility study, comply with environmental regulations (NEPA), and demonstrate the ability to pay the remainder of the construction costs.

- Grant applications require demonstration of the ability to construct, operate, and maintain the project without grant funding.
- Grant award or funding authorization is NOT a promise of grant reimbursement:
  - Most grants are reimbursements and not cash up front. This requires that a source of funding be available for the construction of the project.
  - Grant reimbursements are subject to annual budget and appropriations process and thus disbursement of grant funds on schedule is not guaranteed.
  - It may take several years after project completion to receive reimbursements, especially in difficult economic times.
  - Most grants require a minimum cost share by project sponsor.
  - Federal grants typically require investment of additional resources to obtain lobbying support.

Despite the competitive nature of alternate funding, available funding sources should be considered to minimize ratepayer impacts. The following sections summarize available state and federal funding options.

8.2.3.1 State Funding

Several state funding sources are applicable to the recycled water project alternatives. Due to the California state budget difficulties, some of these programs may be suspended or not have funding available when the agency is ready to move to construction.

8.2.3.1.1 *Water Recycling Funding Program*

One option for financing the Recycled Water Project is the Water Recycling Funding Program administered by the State Water Resources Control Board. The program offers funding for research, feasibility studies, planning, and construction. The program is financed through Propositions 13, 50, and the State Revolving Fund (SRF):

- Recycling projects are categorized by their potential benefits to state and local communities, which in turn determine which funding sources are applicable.
- Category I projects will offset state water supplies and increase water to the Delta.
- Category II projects will offset state water use, but do not provide benefits to the Delta.
- Category III projects use recycled water to supplement local water supplies but have no impact on the state water supply or the Delta.

- Category IV projects will treat and reuse groundwater contaminated by human activity.
- Category V projects will treat and dispose wastewater to meet waste discharge regulations.

Category VI captures miscellaneous projects that do not fall into other categories and have no benefits to state or local water supplies.

The recycled water alternatives will likely fall into Category III. The source of available funding varies with the category in which the project is classified. The maximum award for construction grants for Category I through IV projects is the lesser value of $5 million per project or 25 percent of construction costs.

Category V and VI projects are only eligible for SRF loans. Loans are capped at $50 million per agency per year. The SRF interest rate is set at one-half of the state GO bond rate and has historically averaged around 2.5 percent.

The SWRCB provides one application package for both construction grants and SRF recycled water loans. The application package consists of:

- Financial Assistance Application.
- Facilities Plan composed of:
  - Project report.
  - Environmental documents including CEQA documents.
  - Construction Financing Plan.
  - Recycled Water Market Assurances documenting user participation in the project.
  - Authorized Representative Resolution (Legal Authority).
- Water Conservation Plan demonstrating that the applicant has a water conservation program in effect or has signed onto the California Urban Water Conservation Council's Memorandum of Understanding.

The SWRCB will review the application package and assess eligibility. Once the SWRCB receives and reviews the final plans and specs, it will issue project performance standards. Once performance standards are agreed to and the applicant chooses a contractor, the parties sign a funding agreement. The applicant must also have an Urban Water Management Plan filed with the Department of Water Resources to receive funds.

8.2.3.1.2 *Integrated Regional Water Management Implementation Grant Program*

Grants are available for projects that support IRWM Plans and are related to water supply reliability, groundwater recharge, water quality enhancement etc.

In transitioning from Prop 50 funding to Prop 84 funding, the Department of Water Resources (DWR) altered several of the standards it uses to evaluate regions including governance requirements, acknowledgement of water conflicts, and potential climate change requirements. To facilitate this change, DWR has allowed regions with standing IRWM plans to also receive funds under Prop 84 to comply with the new standards and to develop new projects. Projects seeking funding through this grant process generally submit a project summary to the respective local IRWM management group to review and assess the merits of a project and its ability to fulfill the intent of the IRWM plan. Once approved through this process, a project may be included in the region's implementation grant application.

8.2.3.1.3 *Proposition 1*

Proposition 1 was approved by California voters in November, 2014 and allocates a total of $7.5 billion to water projects and programs as part of a statewide water plan for California. There are six main funding areas defined:

- Regional Water Reliability.
- Water Storage Capacity.
- Water Recycling.
- Groundwater Sustainability.
- Safe Drinking Water.
- Watersheds and Flood Management.

Of these key funding areas, Water Recycling is most applicable to this Recycled Water Feasibility Study and has been allocated $725 million in funds. Water Recycling projects include projects that provide treatment, storage, conveyance, and distribution facilities for both potable and non-potable water sources. Funds are also allocated for pilot projects for new potable reuse projects as well as other salt removal technologies. Water Recycling projects will be awarded under the State Water Resources Control Board and will require a 65 percent cost share.

8.2.3.2 <u>Federal Funding</u>

In addition to local and State grants and loans, there are several highly competitive Federal grant and loan programs that provide financial resources to recycled water projects.

8.2.3.2.1 *Title XVI*

The U.S. Bureau of Reclamation administers funds for recycled water feasibility, demonstration, and construction projects through the Water Reclamation and Reuse Program authorized by the Reclamation Wastewater and Groundwater Study and Facilities Act of 1992 (Title XVI) and its amendments. The program provides as much as 25 percent of construction costs with a maximum of $20 million. To meet eligibility requirements a project must have a feasibility study, comply with environmental regulations, and demonstrate the ability to pay the remainder of the construction costs. Projects are authorized by Congress and recommended in the President's annual budget request by the Bureau of Reclamation. Congress then appropriates funds and the Bureau ranks and prioritizes projects and disburses the money on a competitive grant basis each year. Prioritized projects are those that postpone the development of new water supplies, reduce diversions from natural watercourses, and reduce demand on federal water supply facilities, or that have a regional or watershed perspective.

8.3 RECYCLED WATER PRICING POLICY

Typically, the costs of recycled water projects are recovered through a combination of methods where costs are shared amongst recycled water customers, potable water customers, and wastewater customers. Several recycled water cost recovery alternatives were considered relative to capital, O&M, and repair and replacement (R&R) costs. Dependent on the preferred cost recovery strategy, the corresponding pricing alternatives were developed assuming no cost sharing between different users.

8.3.1 Capital Cost Recovery

The capital costs associated with the recycled water system will consist of treatment, pumping, pipelines and above ground storage tanks.

Implementation of expansive recycled water projects requires large up-front capital. The current project implementation plan proposes to finance the construction of the recommended project through available low-interest SRF loans. There are several alternatives by which the associated debt service can be recovered. These include:

- Consumption based service charges where water, wastewater and recycled water users are assessed their fair share of costs (annual debt service) of the recycled water project based on their quantity of potable or recycled water used.
- System capacity fees where users connecting to the water, wastewater, and recycled water systems pay a one-time fee for the system capacity utilized.

The construction of the recycled water distribution system develops a local, drought resistant, and reliable supply that is less sensitive to climate changes. Additionally, it reduces the need for perhaps more costly future water supplies and utilizes an under-utilized local resource. The recycled water system will provide increased supply reliability and mitigate future costs of purchased imported water for the Sonoma County Water Agency or other water supply projects. As such, in the Draft 2015 Cost of Service Study by Carollo, MMWD has allocated a portion of the recycled water system's capital costs to water customers via monthly charges, recognizing the shared benefit received by all system customers. Any additional or remaining costs could be recovered through a recycled water user charge and possible buy-in (capacity) charge.

8.3.2 Operations and Maintenance Cost Recovery

The O&M costs associated with the recycled water system will consist of treatment and distribution components. O&M costs are most typically recovered through user charges.

Similar to capital costs, it is possible for CMSA to recover its O&M costs using a combination of fixed and consumption based methods. As the causation of the recycled water O&M costs is correlated to increased reliability, efficient use of resources, and utilization of the system, the pricing policy proposes to recover the O&M costs on a consumption basis from recycled water customers.

8.3.3 Repair and Replacement Cost Recovery

Similar to O&M costs, the R&R costs can also be recovered using a combination of fixed and consumption based methods. The proposed recycled water pricing policy would allow recovery of annual R&R costs from its users through a system service and consumption based fee with the assumption that any R&R required is a result of system use and availability.

8.3.4 Costs Allocated to Potable Water or Wastewater Systems

Implementation of the recycled water project may facilitate compliance with the 2009 CA Water Conservation Act to reduce 20 percent of urban water use by 2020. Additionally, the project may help reduce the need for and the size of future, perhaps more costly, water supplies and capital improvements.

Recycled water could become an important part of the regions overall water supply portfolio as it saves potable water for domestic needs. Utilizing recycled water for irrigation and other non-potable uses provides customers with a drought resistant water supply. Additionally, the recycled water system will provide increased supply reliability and mitigate future costs of increasingly expensive purchased water. Based on the provided benefit, including reliability, to potable users, a portion of the recycled water system's capital costs could appropriately be allocated to potable water and wastewater customers, as long as the avoided costs are appropriately defined and detailed in a cost of service rate study. This approach has been used an documented as part of the 2015 MMWD Cost of Service Study for the District's existing recycled water program. The remaining costs would then be recovered through a recycled water user charge and possible buy-in (connection) charge.

8.3.5 Recycled Water Pricing Summary

The recycled water pricing summary for the various project cost elements is summarized in Table 8.2. Should CMSA and MMWD elect to proceed with the recommended alternative, it would be necessary to conduct a cost of service study in the future to appropriately and equitably determine the impacts to water, wastewater, and recycled water rates.

Table 8.2 Funding Source Summary
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Cost Description	Allocation	Cost Unit(1)
Capital Cost	Water/Wastewater/Recycled Water	$ per hcf or af(1)
O&M and R&R Cost	Treatment – Water/Wastewater/ Recycled Water Distribution - Recycled Water	$ per hcf or af(1)

Note:
(1) Cost recovery strategy of consumption-based charges was determined to be most appropriate at this stage of the recycled water project. Rates and charges would be set to recover the annual debt service, O&M, and R&R costs from water, wastewater, and recycled water users as appropriate.

8.4 ANNUAL COST PROJECTIONS

8.4.1 Capital Costs

The total capital cost for the recommended alternative is estimated to be approximately $6,820,000 before soft costs and permitting.

It was assumed for planning purposes that the project would be funded through a 30-year State Revolving Fund loan. Annual debt service was calculated using a 1.0 percent interest rate over a 30-year period for each project phase. With these assumptions, the annual debt service payment would be roughly $330,000.

The annual cash flow projections for assuming debt financing is presented in Appendix J. It is forecasted that the annual payments collected from recycled water revenues will be greater than the calculated annual debt service.

8.4.1.1 Salvage Value

The salvage value of the recommended alternative at the end of the debt period was calculated assuming an average useful life of 50 years for the system. Engineering, legal, administrative, and contingency costs were assumed to have no salvage value. The salvage value of the distribution system is estimated at $109,000.

8.4.2 Operations and Maintenance Costs

The majority of O&M costs associated with the recycled water program will be dependent upon the volume of recycled water demand. In addition, potential annual administrative and distribution costs of expanding the system may include:

- Salaries and benefits.
- Inspections costs.
- Metering and meter reading costs.
- Billing costs.
- System cleaning and maintenance costs.
- Public outreach costs.

For the purposes of this analysis, O&M capital costs are assumed at $117,000 or roughly 1.75 percent of construction costs. Prior to the implementation of rates, it is recommended that CMSA perform a cost-of-service study based on refined cost projections. Table 8.3 summarizes the estimated annual O&M costs of the system.

**Table 8.3 Operations and Maintenance Cost Summary
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District**

Description	Annual Cost (2015 Dollars)
Estimated O&M	$117,000
Total	**$117,000**

Note: Costs are forecasted to increase at 3 percent annually.

8.4.3 Total Annual Project Expenses

Table 8.4 presents a summary of the estimated project costs for the recommended project and the allocation of costs to water, wastewater, and recycled water customers. Since project implementation helps reduce the necessity of future water supply needs, MMWD may opt to recover the costs allocated to the water system from future water customers. Similarly, CMSA may opt to allocate costs to both existing and wastewater future customers as the project helps CMSA comply with discharge limits and meet their policy objectives.

A cash flow forecast was developed over a 30-year period for the recycled water project assuming that the recommended alternative project will start planning and design in 2016 and complete construction in 2020. A summary of the cash flows for this scenario is presented in Appendix J. It is assumed that the annual revenues collected from ratepayers would be sufficient to recover annual debt service and operations costs.

Table 8.4 Recommended Project Annual Cost Summary and Allocation Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Expense Type	**Total Annual Expense**	**Water Customers(1)**	**Wastewater Customers(1)**	**Recycled Water Customers(1)**
Capital (Debt Service/Loan Repayment)(2)				
Recommended Alternative	$330,000	$ -	$ -	$330,000
Operating Expense				
Recommended Alternative	$117,000	$ -	$ -	$117,000
Capital Replacement				
Annual R&R	$ -	$ -	$ -	$ -
Total Annual Revenue Requirement	**$447,000**	**$ -**	**$ -**	**$447,000**

Notes:
(1) No recycled water costs are assumed to be shared between the water or wastewater utilities.
(2) The debt service presented is the debt service associated with a 30-year term and 1 percent interest.

8.4.4 Recycled Water Use Projections and Unit Costs

The projected recycled water use for the recommended alternative (based on identified acreage and land use) is 154 AFY. Projected recycled water use is anticipated to be primarily for irrigation, boiler make-up water, and dual plumbing.

Preliminary unit costs for each user category were developed using the proposed cost recovery strategy.

Table 8.5 presents a summary of the unit costs. These unit costs are preliminary and are not based on a detailed cost-of-service study. The allocation of costs, unit costs, and rates for water, wastewater, and recycled water will be developed to recover the cost of construction and operation through a later performed cost-of-service study.

8.4.5 Preliminary Recycled Water Price

MMWD currently has recycled water rates in place that fund existing recycled water operations. Currently, MMWD maintains a three tiered inclining block rate structure (Tier 1 is $2.57, Tier 2, is $5.13, and Tier 3 is $10.26). Each recycled water customer is budgeted a water allowance and each tier is reflective of a percent of that allowance (Tier 1 is up to 100 percent of allowance, Tier 2 is between 101 and 150 percent, and Tier 3 is in excess of 150 percent of their allowance). This structure not only encourages conservation but also efficient use of recycled water. Please note, MMWD is currently finalizing a cost of service rate study to adjust rates in January 2016. These rate recommendations include cost recovery of the recycled water expansion in both the potable and recycled water rates.

Table 8.5 Summary of Unit Costs
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Expense Type	Total Annual Expense	Unit Cost(1)		
		Water(2)	Wastewater(3)	Recycled Water(4)
Capital Costs				
Annual Debt Service(5)	$330,000	$0.00 per hcf $0.00 per AF	$0.00 per hcf $0.00 per AF	$4.97 per hcf $2,163 per AF
Operating Costs				
Treatment and Distribution O&M	$98,000	$0.00 per hcf $0.00 per AF	$0.00 per hcf $0.00 per AF	$1.76 per hcf $767 per AF

Notes:
(1) Unit costs are based on completion the recommended alternative.
(2) No costs, at this time, have been allocated to water.
(3) No costs, at this time, have been allocated to wastewater.
(4) Recycled water unit costs are presented based on 154 acre-feet per year.
(5) Assumes a 30-year term with an interest rate of 1.0 percent.

The cost recovery strategy outlined in this analysis presents rates to recover the cost associated with capital infrastructure and recycled water system operation is through recycled water only. Based on the benefits of the system provided to water and wastewater systems, it is possible for these expenditures to be recovered through a combination of water, wastewater, and recycled water rates.

As previously discussed, the repayment of the project costs is anticipated to be spread across all project beneficiaries. Table 8.6 summarizes the estimates of project costs per acre and per acre-foot of consumption.

8.4.6 Comparison to Potable Water Prices

For both commercial and raw/recycled water rates, MMWD has a three tier commodity rate structure and a fixed monthly service charge based on meter size. The tier sizes are individually set by customer based on water allocation and purchased system capacity. Please note, MMWD is currently finalizing a rate study to adjust rates in January 2016. Appendix J provides the most recent utility rate information.

MMWD currently maintains a tiered potable water rate of $3.74, $7.48, and $14.97 per CCF for tiers 1, 2, and 3 respectively. One unit of water is 1 CCF or roughly 748 gallons. Assuming a blended cost of water at Tier 2 ($7.48/CCF or $3,258/AF), any proposed rate less than that would support the recommended alternative.

Table 8.6 Price of Recycled Water for Repayment of Capital Costs Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District	
Cost Summary	
Project Cost(1)	$8,530,000
Annual O&M	$117,000
Annual R&R Costs	$ -
Consumption Summary	
Projected Annual Consumption	154 AFY
Price Summary	
Unit Price of Project Construction(2)	$2,163
Unit Price of Delivered Water(3)	$2,930
Unit Price of Project over 30 Years(4)	$2,840

Notes:
(1) Project costs include estimating contingencies and estimates for engineering, legal, administrative, and environmental costs.
(2) Price represents the rate associated with the Project Cost (capital only).
(3) Price per acre-foot is applicable to only metered recycled water customers. This price is based on annual use of 154 acre-feet per year and includes all O&M and capital costs.
(4) The unit price shown was calculated using the SWRCB present worth analysis methodology. The present worth analysis was conducted on the projected cash flows over a 30-year period using a present worth factor of 3.0%.

8.4.7 Sensitivity Analysis

Once available, it is assumed that recycled water sales will meet projected annual consumption in its first year. It is possible that the actual recycled water consumption is above and below the projected assumed recycled water consumption. A sensitivity analysis was conducted to evaluate the impact of change in consumption on unit recycled water price. The analysis conservatively assumes no change in annual expenditures, despite a reduction in delivered water. Table 8.7 summarizes this sensitivity analysis.

8.4.8 Recommended Project Benefit-Cost Analysis

In order to calculate the quantitative benefit cost of the project cost, a present worth analysis was conducted on the projected cash flows over a 30-year period using a present worth factor of 3.0 percent. The unit cost of the recommended project was estimated using the present value of the project capital and O&M costs as well as recycled water consumption. The estimated unit cost was $2,840 per acre-foot using the SWRCB present worth analysis methodology. Detailed calculations are provided in Appendix J.

Table 8.7 Sensitivity Analysis
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

	Price at No Change in Consumption	Price at 5% Less Consumption	Price at 10% Less Consumption	Price at 25% Less Consumption
Annual Recycled Water Consumption	154 AFY	145 AFY	137 AFY	114 AFY
Capital Costs(1)				
Price per Acre-Foot	$2,164	$2,278	$2,404	$2,885
O&M and R&R Costs				
Price per Acre-Foot	$767	$808	$852	$1,023

Note:
(1) As capital costs are based on estimated debt service for a 30-year term at 1 percent interest.

Qualitative costs of the project include short-term construction impacts such as noise, environmental and aesthetic nuisance. Qualitative benefits of the recommended project include the following:

- The promotion of sustainability through the availability of the new drought proof supply.
- Alternate disposal of treated effluent through irrigation use.
- Facilitation of compliance with the 2009 CA Water Conservation Act goal to achieve a 20 percent reduction in urban water consumption by 2020.
- Potential economic benefit of creating/expanding green infrastructure.
- The avoided use of surface water resources in the region.
- Greenhouse gas reduction for recycled water use.

APPENDIX A – SWRCB WATER RECYCLING FUNDING GUIDELINES

RECOMMENDED PLANNING OUTLINE FOR WATER RECYCLING PROJECTS

This facilities planning report outline emphasizes the information relevant to water recycling and its application for water supply purposes. The outline is inclusive and not all items may be applicable to every project.

Facilities Plan/Project Report

A. Maps and Diagrams

1. Vicinity Map.
2. Detailed map of study area boundaries.
3. Topographic map.
4. City boundaries.
5. Wholesale and retail water supply entity boundaries within study area and adjacent to study area.
6. Wastewater agency boundaries within and adjacent to study area.
7. Existing recycled water distribution pipelines, storage, and customers.
8. Ground water basin boundaries, major streams, streams receiving waste discharges.
9. Present and projected land use.
10. Each recycled water facilities alternative (including recommended project), showing locations of potential customers and approximate pipeline routes.
11. Wastewater treatment schematic--existing and proposed.

B. Study Area Characteristics

1. Hydrologic features.
2. Ground water basins, including quantities extracted by all users, natural and artificial recharge, losses by evapotranspiration, inflow and outflow of basins, and safe yield or overdraft.
3. Water quality - ground water and surface water.
4. Land use and land use trends.
5. Population projections of study area.
6. Beneficial uses of receiving waters and degree of use, portion of flow that is effluent.

C. Water Supply Characteristics and Facilities

1. Description of all wholesale and retail entities.
2. All sources of water for study area and major facilities, their costs, (costs should be broken down into fixed and variable), subsidies, and customer prices.
3. Capacities of present facilities, existing flows, estimated years when capacities to be reached for major components (water treatment plants, major transmission and storage facilities).
4. Ground water management and recharge, overdraft problems.
5. Water use trends and future demands, prices and costs.
6. Quality of water supplies.

7. Sources for additional water and plans for new facilities (for both the local entity and the wholesalers).

D. <u>Wastewater Characteristics and Facilities</u>

1. Description of entities.
2. Description of major facilities, including capacities, present flows, plans for new facilities, description of treatment processes, design criteria.
3. Water quality of effluent and any seasonal variation.
4. Additional facilities needed to comply with waste discharge requirements.
5. Sources of industrial or other problem constituents and control measures.
6. Existing recycling, including users, quantities, contractual and pricing arrangements.
7. Existing rights to use of treated effluent after discharge.
8. Wastewater flow variations - hourly and seasonal.

E. <u>Treatment Requirements for Discharge and Reuse</u>

1. Required water qualities for potential uses.
2. Required health-related water qualities or treatment requirements for potential uses, operational and on-site requirements (such as backflow prevention, buffer zones).
3. Wastewater discharge requirements, anticipated changes in requirements.
4. Water quality-related requirements of the RWQCB to protect surface or ground water from problems resulting from recycled water use.

F. <u>Recycled Water Market</u>

1. Description of market assessment procedures.
2. Descriptions of all users or categories of potential users, including type of use, expected annual recycled water use, peak use, estimated internal capital investment required (on-site conversion costs), needed water cost savings, desire to use recycled water, date of possible initial use of recycled water, present and future source of water and quantity of use, quality and reliability needs, and wastewater disposal methods.
3. Summary tables of potential users and related data.
4. Definition of logical service area based on results of market assessment.

G. <u>Project Alternative Analysis</u>

1. Planning and design assumptions:
   a. Delivery and system pressure criteria.
   b. Peak delivery criteria.
   c. Storage criteria.
   d. Cost basis: cost index, discount rate, useful lives, etc.
   e. Planning period.
2. Water Recycling Alternatives to be Evaluated
   a. Treatment alternatives:

        i. Alternative levels of treatment.
        ii. Alternative unit processes to achieve a given level of treatment.
    b. Pipeline route alternatives.
    c. Alternative markets:
        i. Based on different levels of treatment.
        ii. Geographical areas.
    d. Alternative storage locations.
    e. Sub alternatives of selected alternative:
        i. Marginal analysis for selected alternative for certain categories of users or certain geographic areas.
        ii. Varying storage, pump rates, and pipeline diameters.
        iii. Use of water blending during peak irrigation months.
2. Non-recycled water alternatives.
    a. Discussion of other potentially viable new sources of water.
    b. Provide economic costs.
3. Water conservation/reduction analysis.
    a. Analysis.
    b. Impact on recycling, if any.
    c. Recommendation.
    d. Implementation.
4. Pollution control alternatives (if applicable) needed to comply with waste discharge requirements, and possible allocation of costs between recycling and pollution control.
5. No project alternative.
6. Information supplied for each alternative to include, but not be limited to:
    a. Cost tables for each alternative with breakdown of costs by total capital (without grants), O&M, unit processes, and with equivalent annual cost and per acre-foot cost.
    b. Lists of potential users assumed for each alternative.
    c. Economic analysis.
    d. Energy analysis for each alternative, including direct and construction energy.
    e. Water quality impacts:
        i. Effect on receiving water by removing or reducing discharge of effluent, including effect on beneficial uses resulting from reduced flow.
        ii. Ground water impacts.
7. Comparison of above alternatives and recommendation of specific alternative.

H. <u>Recommended Facilities Project Plan</u>

1. Description of all proposed facilities and basis for selection.
2. Preliminary design criteria and refined pipeline routes.
3. Cost estimate based on time of construction.
4. List of all potential users, quantity of recycled water use, peak demand, and commitments obtained.
5. Reliability of facilities as compared to user requirements.
6. Implementation plan:
    a. Coordination with water suppliers, determination of recycled water supplier and needed agreements or ordinances.

   b. Ability and timing of users to join system and make on-site investments.
   c. Tentative water recycling requirements of RWQCB.
   d. Commitments from potential users.
   e. Water rights impact.
   f. Permits, right-of-way, design, construction.
   g. Detailed schedule.
7. Operational plan - responsible people, equipment, monitoring, irrigation scheduling, etc.

I. <u>Construction Financing Plan and Revenue Program</u>

1. Sources and timing of funds for design and construction.
2. Pricing policy for recycled water.
3. Costs that can be allocated to water pollution control.
4. Annual projection of:
   a. Water prices for each user or category of users.
   b. Recycled water used by each user.
   c. Annual costs (required revenue) of recycling project.
   d. Allocation of costs to users.
   e. Unit costs to serve each user or category of users.
   f. Unit price of recycled water for each user or category of users.
   g. Sensitivity analysis assuming portion of potential users fail to use recycled water.
5. Sunk costs and indebtedness.

J. <u>Appendices</u>

1. Tables of all abbreviations.
2. Copies of letters of interest or intent from recycled water users, or other documentation of support from potential users.
3. Draft of recycled water mandatory use ordinance or model user contract.
4. Drafts of necessary agreements, such as wholesale-retail agreement, joint powers agreement.

APPENDIX B – EXISTING RECYCLED WATER AGREEMENTS

→ Nancy FYI
cc Ron
Nancy

STATE OF CALIFORNIA—THE RESOURCES AGENCY
GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION
1111 JACKSON STREET, ROOM 6040
OAKLAND 94607

Phone: Area Code 415
464-1255

May 11, 1988
File No. 2156.00 (ADF)

Carolyn Campbell
Director of Public Works
City of Larkspur
Po. Box 585
Larkspur, CA 94939

RECEIVED
MAY 13 1988
CENTRAL MARIN

Dear Ms. Campbell:

This letter is in reference to the Remillard Pond in Larkspur. You have requested the use of reclaimed water from the Central Marin Sanitation Agency's (CMSA) treatment plant in San Rafael several times in the past two years, in order to maintain a proper water level for the pond's wildlife.

Given the high quality of the effluent from the Central Marin plant, there does not appear to be any adverse water quality impacts associated with this use of reclaimed water. Therefore, we do not feel that waste discharge requirements will be necessary. However, the use of reclaimed water does pose a possible public health risk, and so this use of reclaimed water is contingent upon the following conditions:

- o The Regional Board is to be given at least 5 days advance notice of the intention to use reclaimed water.
- o Signs will be posted around the pond noting the presence of reclaimed water, and warning visitors not to drink or come in contact with the pond water.
- o Reclaimed water shall meet the following bacteriological limits: median number of coliform organisms shall not exceed 23 MPN per 100 milliliters, as determined from the results of the last 7 days on which samples were taken.
- o Sampling for total coliform organisms shall be conducted daily when reclaimed water is being discharged to the pond. Sampling can be done at the CMSA treatment plant to satisfy this condition. These results are to be sent to the Regional Board as soon as possible following the discharge of the reclaimed water.
- o A minimum of a two-foot freeboard is to be maintained at all times.

We are pleased to be of assistance in this wildlife enhancement project. If you should have any questions, feel free to call Alan Friedman of my staff at (415) 464-0806.

Sincerely yours,

Roger B. James
Executive Officer

cc Joseph Remley, CMSA
Robert Holtquist, DOHS
Mike Rugg, DFG
Barbara Salzman, Marin Audobon

APPENDIX C – NPDES PERMIT

ORDER NO. R2-2012-0051
NPDES NO. CA0038628

The following discharger and discharge points are subject to waste discharge requirements set forth in this Order.

Table 1. Discharger Information

Discharger	Central Marin Sanitation Agency
Name of Facility	Central Marin Sanitation Agency Wastewater Treatment Plant and its associated force mains
CIWQS Place Number	213889
Facility Address	1301 Anderson Drive, San Rafael, CA 94901
The U.S. Environmental Protection Agency (USEPA) and the Regional Water Quality Control Board have classified this discharge as a major discharge.	

Table 2. Discharge Location

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary Treated Municipal Wastewater	37º 56′ 54″ N	122º 27′ 23″ W	Central San Francisco Bay

Table 3. Administrative Information

This Order was adopted by the Regional Water Quality Control Board on:	June 13, 2012
This Order shall become effective on:	August 1, 2012
This Order shall expire on:	July 31, 2017
The Discharger shall file a Report of Waste Discharge in accordance with Title 23, California Code of Regulations, as application for re-issuance of waste discharge requirements no later than:	January 31, 2017

I, Bruce H. Wolfe, Executive Officer, do hereby certify that this Order with all attachments is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, San Francisco Bay Region, on the date indicated above.

Bruce H. Wolfe, Executive Officer

Contents

Tables

Attachments

I. FACILITY INFORMATION

The following facility is subject to the waste discharge requirements set forth in this Order:

Table 4. Facility Information

Discharger	Central Marin Sanitation Agency
Name of Facility	Central Marin Sanitation Agency Wastewater Treatment Plant and its associated force mains
Facility Address	1301 Anderson Drive, San Rafael, CA 94901
CIWQS Place Number	213889
CIWQS Party Number	147457
Facility Contact, Title, and Phone	Robert N. Cole, Environmental Services Manager, (415) 459-1455
Mailing Address	Same as Facility Address
Type of Facility	Publicly Owned Treatment Works
Facility Design Flow	10.0 million gallons per day (MGD) (average daily dry weather flow) 30 MGD (secondary treatment capacity)
Service Area	City of San Rafael, City of Larkspur, San Quentin Prison, and nearby unincorporated areas
Service Population	129,000

II. FINDINGS

The California Regional Water Quality Control Board, San Francisco Bay Region (hereinafter Regional Water Board), finds:

A. Background. Central Marin Sanitation Agency (hereinafter Discharger) is currently discharging under Order No. R2-2007-0007 (CIWQS Regulatory Measure No. 319575), National Pollutant Discharge Elimination System (NPDES) Permit No. CA0038628. The Discharger submitted a Report of Waste Discharge dated October 3, 2011, and applied for an NPDES permit reissuance to discharge treated wastewater from its wastewater treatment plant to waters of the State and the United States. The discharge is also regulated under Regional Water Board Order No. R2-2007-0077 (NPDES Permit No. CA0038849), as amended by Order No. R2-2011-0012, which superseded all requirements on mercury and polychlorinated biphenyls (PCBs) from wastewater discharges. This Order does not affect the mercury and PCBs permit.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and State laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. Facility Description and Discharge Location

1. **Facility Description.** The Discharger was formed under a Joint Exercise of Powers Agreement in 1979 by the San Rafael Sanitation District, Sanitary District No. 1 of Marin County (also known as Ross Valley Sanitary District), Sanitary District No. 2 of Marin County (a subsidiary of the Town of Corte Madera), and the City of Larkspur. The Discharger owns and operates the Central Marin Sanitation Agency Wastewater Treatment Plant (hereinafter Plant) and approximately 3,800-foot of force mains immediately upstream of the Plant (hereinafter, collectively, Facility). The Plant, located within the City of San Rafael, provides secondary

treatment of domestic, commercial, and industrial wastewater for its four member agencies and the California Department of Corrections (San Quentin Prison). The population of the service area is approximately 129,000. Attachment B provides a map of the area around the Plant. From April 2007 through March 2010, the average dry weather flow rate was 6.2 MGD and the average wet weather flow rate was 12.3 MGD. Two significant industrial users discharge to the Facility and are regulated through the Discharger's pretreatment program.

2. **Collection System.** The Discharger owns and operates approximately 3,800 feet of force mains immediately upstream of the Plant (location shown in Attachment B). The Discharger does not own or operate any of the sewer systems that feed into the Discharger's force mains. These are owned and operated by separate agencies. Sanitary District No. 1 of Marin County owns and operates about 200 miles of sewer lines serving Larkspur and nearby unincorporated areas (Kentfield, Greenbrae, Fairfax, Ross, and San Anselmo). Sanitary District No. 2 of Marin County owns and operates about 45 miles of sewer lines serving the Town of Corte Madera. San Rafael Sanitary District owns and operates about 150 miles of sewer lines serving the City of San Rafael. The California Department of Corrections owns and operates a sewer collection system serving the San Quentin Prison. The prison is about one mile from the Plant. The County of Marin also owns and operates a sewer collection system serving San Quentin Village that discharges into the lines owned by the prison. The Discharger operates and maintains pump stations under contract for Sanitary District No. 2 of Marin County. All of the above described collection systems, except for the portions owned by the California Department of Corrections and the County of Marin, and the Discharger's force mains, are covered by the State Water Resources Control Board's (State Water Board) General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ).

3. **Treatment Description.** Treatment processes consist of screening, grit removal, primary sedimentation, secondary biological treatment, secondary clarification, chlorination, and dechlorination. During periods of wet weather, primary treated effluent flows greater than 30 MGD are routed around secondary treatment and blended with secondary treated effluent prior to disinfection. The Discharger's outfall pipeline between the Plant and San Francisco Bay is located partially below the tideline elevation. This impedes the Discharger's ability to discharge effluent during wet weather and high tide conditions, requiring the use of an effluent pumping station built in 2010. The Plant uses an onsite storage basin to store up to 7 million gallons of effluent during wet weather. When flows subside, the stored wastewater is either sent to the chlorine disinfection units for discharge or routed back to the headworks for re-treatment (for example, if for some reason it does not meet discharge limitations). These steps are shown in the process flow diagram in Attachment C.

4. **Discharge Point.** Secondarily-treated wastewater is discharged at Discharge Point No. 001 to Central San Francisco Bay via a submerged outfall equipped with a multi-port diffuser. The diffuser is approximately 8,000 feet offshore at a depth of about 12 to 28 feet at mean lower low water. It is oriented about 145 degrees clockwise from north and has 176 ports fitted with duckbill diffuser valves to induce turbulent mixing. The valves reduce the effective open area of the ports as flow is reduced.

5. **Biosolids Management.** Solids from the primary clarifiers and secondary clarifiers are processed via dissolved air flotation, anaerobic digestion, and polymer and ferric chloride conditioning. Processed solids are dewatered using high speed centrifuges and hauled offsite. They are land applied at Synagro West's Lakeville Ranch sites in Sonoma County, reused at

Redwood Landfill and Recycling Center in Marin County as alternative daily cover, or composted.

6. **Stormwater Discharge.** The Discharger is covered under the State Water Board's statewide industrial stormwater NPDES permit (NPDES General Permit No. CAS000001) for all parts of the Plant that do not drain back to the headworks. All stormwater flows in contact with equipment or wastewater at the Plant and the pump stations serving the Plant are collected and directed to the headworks for treatment.

7. **Water Recycling.** The Discharger provides reclaimed water to Remillard Park Pond to provide habitat for an endangered species of turtle. The water is provided during the dry season when requested by the City of Larkspur due to low water in the pond, endangering the survival of the pond's wildlife.

C. **Legal Authorities.** This Order is issued pursuant to Clean Water Act (CWA) section 402 and implements regulations adopted by USEPA and California Water Code (CWC) chapter 5.5, division 7, commencing with section 13370. It serves as an NPDES permit for point source discharges from the Facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC article 4, chapter 4, division 7, commencing with section 13260.

D. **Background and Rationale for Requirements.** The Regional Water Board developed the requirements in this Order based on information submitted as part of the application, through monitoring and reporting programs, and other available information. The Fact Sheet (Attachment F), which contains background information and rationale for requirements of the Order, is hereby incorporated into this Order and constitutes part of the findings for this Order. Attachments A through E, G, and H are also incorporated into this Order.

E. **California Environmental Quality Act (CEQA).** Under CWC section 13389, this action to adopt an NPDES permit is exempt from Chapter 3 of CEQA.

F. **Technology-Based Effluent Limitations.** CWA section 301(b) and NPDES regulations at Title 40 of the Code of Federal Regulations section 122.44 (40 CFR 122.44) require that permits include conditions meeting applicable technology-based requirements at minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR 133. Further discussion of the technology-based effluent limitations is included in the Fact Sheet (Attachment F).

G. **Water Quality-Based Effluent Limitations (WQBELs).** CWA section 301(b) and 40 CFR 122.44(d) require that permits include limitations more stringent than applicable federal technology-based requirements where necessary to achieve applicable water quality standards. NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have the reasonable potential to cause or contribute to an exceedance of a water quality standard, including numeric and narrative objectives within a standard. Where reasonable potential has been established for a pollutant, but there is no numeric criterion or objective for the pollutant, WQBELs must be established using (1) USEPA criteria guidance under CWA section 304(a), supplemented where necessary by other relevant information; (2) an indicator parameter for the pollutant of concern; or (3) a calculated numeric water quality criterion (WQC), such as a proposed state criterion or policy interpreting the state's narrative criterion, supplemented with other relevant information, as provided in 40 CFR 122.44(d)(1)(vi).

H. Water Quality Control Plan. *The Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives (WQOs) for waters of the State, including surface and groundwater. It also includes implementation programs to achieve WQOs. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Board, the Office of Administrative Law, and USEPA. Requirements of this Order implement the Basin Plan. Basin Plan beneficial uses for Central San Francisco Bay are listed in the table below.

Table 5. Basin Plan Beneficial Uses

Receiving Water Name	Beneficial Uses
Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PROC) Commercial, and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

I. National Toxics Rule (NTR) and California Toxics Rule (CTR). USEPA adopted the NTR on December 22, 1992, and later amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR apply in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain WQC for priority pollutants.

J. State Implementation Policy. On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (hereinafter State Implementation Policy [SIP]). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated through the NTR and to the priority pollutant objectives established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria USEPA promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005, that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

K. Alaska Rule. On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000), codified at 40 CFR 131.21]. Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

L. Stringency of Requirements for Individual Pollutants. This Order contains both technology-based and water quality-based effluent limitations for individual pollutants. The technology-based effluent limitations consist of restrictions on carbonaceous biochemical oxygen demand (CBOD), total suspended solids (TSS), and pH. These technology-based limitations are discussed further in the Fact Sheet (Attachment F). This Order's technology-based pollutant restrictions on CBOD, TSS, and pH implement the minimum applicable federal technology-based requirements and are more stringent than the minimum federal technology-based requirements only as necessary to meet water quality standards.

WQBELs have been derived to implement WQOs that protect beneficial uses. Both the beneficial uses and the WQOs have been approved pursuant to federal law and are the applicable federal water quality standards. To the extent that toxic pollutant WQBELs were derived from the CTR, the CTR is the applicable standard pursuant to 40 CFR 131.38. On May 18, 2000, USEPA approved the procedures for calculating individual WQBELs for priority pollutants based on the SIP. Most beneficial uses and WQOs contained in the Basin Plan were approved under State law and submitted to USEPA. Any WQOs and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for the purposes of the CWA" pursuant to 40 CFR 131.21(c)(1).

M. Antidegradation Policy. NPDES regulations at 40 CFR 131.12 require that state water quality standards include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

N. Anti-Backsliding Requirements. CWA sections 402(o)(2) and 303(d)(4) and NPDES regulations at 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require effluent limitations in a reissued permit to be as stringent as those in the previous permit, with some exceptions where limitations may be relaxed.

O. Endangered Species Act. This Order does not authorize any act that results in the taking of a threatened or endangered species or any act that is now prohibited, or becomes prohibited in the future, under either the California Endangered Species Act (Fish and Game Code sections 2050 to 2097) or the federal Endangered Species Act (16 U.S.C.A. sections 1531 to 1544). This Order requires compliance with effluent limits, receiving water limits, and other requirements to protect the beneficial uses of waters of the State. The Discharger is responsible for meeting all requirements of applicable State and federal law pertaining to threatened and endangered species.

P. Monitoring and Reporting. NPDES regulations at 40 CFR 122.48 require that all NPDES permits specify requirements for recording and reporting monitoring results. CWC sections 13267 and 13383 authorize the Regional Water Board to require technical and monitoring reports. The Monitoring and Reporting Program (MRP, Attachment E) establishes monitoring and reporting requirements to implement federal and State requirements.

Q. Standard and Special Provisions. Attachment D contains Federal Standard Provisions that apply to all NPDES permits in accordance with 40 CFR 122.41, and additional conditions applicable to specified categories of permits in accordance with 40 CFR 122.42. The Discharger must comply with all standard provisions and with those additional conditions that apply under 40 CFR 122.42. The Discharger must also comply with the Regional Standard Provisions provided in Attachment G. The Regional Water Board has also included in this Order special provisions applicable to the Discharger. The Fact Sheet (Attachment F) provides rationales for the special provisions.

R. Provisions and Requirements Implementing State Law. None of the requirements in this Order are included to implement State law only.

S. Notification of Interested Parties. The Regional Water Board notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and provided them with an opportunity to submit written comments and recommendations. The Fact Sheet (Attachment F) provides details of the notification.

T. Consideration of Public Comment. The Regional Water Board, in a public meeting, heard and considered all comments pertaining to the discharge. The Fact Sheet (Attachment F) provides details of the public hearing.

IT IS HEREBY ORDERED, that this Order supersedes Order No. R2-2007-0007, except for enforcement purposes, and, in order to meet the provisions contained in CWC Division 7 (commencing with section 13000) and regulations adopted thereunder, and the provisions of the federal Clean Water Act (CWA) and regulations and guidelines adopted thereunder, the Discharger shall comply with the requirements in this Order.

III. DISCHARGE PROHIBITIONS

A. Discharge of treated wastewater at a location or in a manner different from that described in this Order is prohibited.

B. Discharge at any point at which the treated wastewater does not receive an initial dilution of at least 43:1 (nominal) is prohibited. Compliance shall be achieved by proper operation and maintenance of the discharge outfall to ensure that it (or its replacement, in whole or in part) is in good working order and is consistent with or can achieve better mixing than that described in the Fact Sheet (Attachment F). The Discharger shall address measures taken to ensure this in its application for permit reissuance.

C. The bypass of untreated or partially treated wastewater to waters of the United States is prohibited, except as provided for in the conditions stated in Section I.G.2 and I.G.4 of Attachment D of this Order.

Blended wastewater is biologically-treated wastewater blended with wastewater diverted around biological treatment units or advanced treatment units. Such discharges are approved under the bypass conditions stated in 40 CFR 122.41(m)(4) when (1) the Discharger's peak wet weather influent flow volume exceeds the capacity of the secondary treatment units of 30 MGD, (2) the discharge complies with the effluent and receiving water limitations contained in this Order, and (3) the Discharger is in compliance with Provision VI.C.5. Furthermore, the Discharger shall operate the Facility as designed and in accordance with the Operation & Maintenance Manual for the Facility. This means it shall optimize storage and use of equalization units and shall fully utilize the biological treatment units and advanced treatment units, if applicable. The Discharger shall report incidents of blended effluent discharges in routine monitoring reports and shall monitor this discharge as specified in the MRP (Attachment E).

D. The average dry weather effluent flow, measured at Monitoring Location INF-001 as described in the MRP (Attachment E), shall not exceed 10.0 MGD. Actual average dry weather flow shall be determined for compliance with this prohibition over three consecutive dry weather months each year.

E. Any sanitary sewer overflow that results in a discharge of untreated or partially treated wastewater to waters of the United States is prohibited.

IV. EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

A. Effluent Limitations for Conventional and Non-Conventional Pollutants

1. Discharges at Discharge Point No. 001 shall comply with the following limitations.

Table 6. Conventional and Non-Conventional Pollutant Effluent Limitations

Parameter	Units	Effluent Limitations				
		Average Monthly	Average Weekly	Maximum Daily	Instantaneous Minimum	Instantaneous Maximum
CBOD 5-day @ 20°C ($CBOD_5$)	mg/L	25	40	---	---	---
Total Suspended Solids (TSS)	mg/L	30	45	---	---	---
$CBOD_5$ and TSS percent removal [1]	%	85 minimum	---	---	---	---
Oil and Grease	mg/L	10	---	20	---	---
pH [2]	s.u.	---	---	---	6.0	9.0
Total Chlorine Residual [3]	mg/L	---	---	---	---	0.0

Unit Abbreviations:

mg/L = milligrams per liter
s.u. = standard units

[1] 85 Percent Removal. The arithmetic mean of $CBOD_5$ at 20°C and TSS, by concentration, for effluent samples collected in each calendar month shall not exceed 15 percent of the arithmetic mean of the respective values, by concentration, for influent samples collected at INF-001 as described in the MRP (Attachment E) at approximately the same times during the same period.

[2] pH. If the Discharger monitors pH continuously, pursuant to 40 CFR 401.17, the Discharger shall be in compliance with the pH limitation specified herein provided that both of the following conditions are satisfied: (i) the total time during which the pH values are outside the required range of pH values shall not exceed 7 hours and 26 minutes in any calendar month; and (ii) no individual excursion from the range of pH values shall exceed 60 minutes.

[3] Total Chlorine Residual. The Discharger may elect to use a continuous on-line monitoring system(s) for measuring flows, chlorine residual and sodium bisulfate (or other dechlorinating chemical) dosage (including a safety factor) and concentration to prove that chlorine residual exceedances are false positives. If convincing evidence is provided, Regional Water Board staff may conclude that these false positive chlorine residual exceedances are not violations of this limitation. Compliance shall be measured at EFF-002.

2. **Enterococcus Bacteria:** The geometric mean of the enterococcus densities of all discharge samples collected at Discharge Point No. 001 within each calendar month shall not exceed 35 colonies/100 mL.

3. **Total Coliform Bacteria:** The geometric mean of the total coliform density of all discharge samples collected at Discharge Point No. 001 within each calendar month shall not exceed 240 MPN/100 mL and the daily maximum shall not exceed 10,000 MPN/100 mL.

B. Toxic Substances Effluent Limitations

Discharges at Discharge Point No. 001 shall comply with the following limitations.

Table 7. Toxic Pollutant Effluent Limitations

Constituent	Units	Effluent Limitations[1,2]	
		Average Monthly	Maximum Daily
Copper	µg/L	49	85
Cyanide	µg/L	21	41
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}
Total Ammonia, as N	mg/L	60	120

Unit Abbreviations:

µg/L = micrograms per liter
mg/L = milligrams per liter

[1] Limitations apply to the average concentration of all samples collected during the averaging period (daily = 24-hour period; monthly = calendar month).

[2] All limitations for metals are expressed as total recoverable metals.

C. Whole Effluent Toxicity

1. Whole Effluent Acute Toxicity

a. Discharges at Discharge Point No. 001 shall meet the following limits for acute toxicity (bioassays shall be conducted in compliance with MRP section V.A [Attachment E]):

(1) An eleven (11) – sample median value of not less than 90 percent survival; and
(2) An eleven (11) – sample 90^{th} percentile value of not less than 70 percent survival.

b. These acute toxicity limitations are further defined as follows:

(1) **11-sample median**. A bioassay test showing survival of less than 90 percent represents a violation of this effluent limit, if five or more of the past ten or less bioassay tests show less than 90 percent survival.

(2) **11-sample 90^{th} percentile**. A bioassay test showing survival of less than 70 percent represents a violation of this effluent limit, if one or more of the past ten or less bioassay tests show less than 70 percent survival.

If the Discharger can demonstrate to the satisfaction of the Executive Officer that toxicity exceeding the levels cited above is caused by ammonia and that the ammonia in the discharge complies with effluent limits, then such toxicity does not constitute a violation of this effluent limitation.

c. Bioassays shall be performed using the most up-to-date USEPA protocols and species as specified in MRP section V.A.

2. Whole Effluent Chronic Toxicity

The discharge shall not contain chronic toxicity at a level that would cause or contribute to toxicity in the receiving water. Chronic toxicity is a detrimental biological effect of growth rate, reproduction, fertilization success, larval development, or any other relevant measure of the health of an organism population or community. Compliance with this limit shall be determined by analysis of indicator organisms and toxicity tests measured at EFF-001 as described in the MRP.

V. RECEIVING WATER LIMITATIONS

A. The discharge of waste shall not cause the following conditions to exist in waters of the State:

1. Floating, suspended, or deposited macroscopic particulate matter or foams;
2. Bottom deposits or aquatic growths to the extent that such deposits or growths cause nuisance or adversely affect beneficial uses;
3. Alteration of temperature, turbidity, or apparent color beyond present natural background levels;
4. Visible, floating, suspended, or deposited oil or other products of petroleum origin; and
5. Toxic or other deleterious substances to be present in concentrations or quantities that cause deleterious effects on wildlife, waterfowl, or other aquatic biota, or that render any of these unfit for human consumption, either at levels created in the receiving waters or as a result of biological concentration.

B. The discharge of waste shall not cause the following limits to be exceeded in waters of the State within 1 foot of the water surface:

1. Dissolved Oxygen	5.0 mg/L, minimum Furthermore, the median dissolved oxygen concentration for any three consecutive months shall not be less than 80% of the dissolved oxygen content at saturation. When natural factors cause concentrations less than that specified above, the discharge shall not cause further reduction in ambient dissolved oxygen concentrations.
2. Dissolved Sulfide	Natural background levels
3. pH	The pH shall not be depressed below 6.5 or raised above 8.5. The discharge shall not cause changes greater than 0.5 pH units in normal ambient pH levels.

4. Nutrients	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

C. The discharge shall not cause a violation of any particular water quality standard for receiving waters adopted by the Regional Water Board or the State Water Board as required by the CWA and regulations adopted thereunder. If more stringent applicable water quality standards are promulgated or approved pursuant to CWA section 303, or amendments thereto, the Regional Water Board may revise and modify this Order in accordance with such more stringent standards.

VI. PROVISIONS

A. Standard Provisions

1. **Federal Standard Provisions.** The Discharger shall comply with the Federal Standard Provisions in Attachment D of this Order.

2. **Regional Standard Provisions.** The Discharger shall comply with all applicable items of the Regional Standard Provisions, and Monitoring and Reporting Requirements (Supplement to Attachment D) for NPDES Wastewater Discharge Permits (Attachment G), including amendments thereto.

B. MRP Requirements

The Discharger shall comply with the MRP (Attachment E) and future revisions thereto, including applicable sampling and reporting requirements in the standard provisions listed in Provision VI.A above.

C. Special Provisions

1. Reopener Provisions

The Regional Water Board may modify or reopen this Order prior to its expiration date in any of the following circumstances as allowed by law:

a. If present or future investigations demonstrate that the discharges governed by this Order have or will have a reasonable potential to cause or contribute to, or will cease to have, adverse impacts on water quality or beneficial uses of the receiving waters.

b. If new or revised WQOs or total maximum daily loads (TMDLs) come into effect for the San Francisco Bay Estuary and contiguous water bodies (whether statewide, regional, or site-specific). In such cases, effluent limitations in this Order will be modified as necessary to reflect updated WQOs and waste load allocations in TMDLs. Adoption of effluent limitations contained in this Order is not intended to restrict in any way future modifications based on legally adopted WQOs or TMDLs, or as otherwise permitted under federal regulations governing NPDES permit modifications.

c. If translator, dilution, or other water quality studies provide a basis for determining that a permit condition should be modified.

d. If State Water Board precedential decisions, new policies, new laws, or new regulations on chronic toxicity or total chlorine residual become available.

e. If an administrative or judicial decision on a separate NPDES permit or WDRs addresses requirements similar to this discharge.

f. If the Discharger requests adjustments in effluent limits due to the implementation of a stormwater diversion pursuant to the Municipal Regional Stormwater Permit (Order No. R2-2009-0074) for redirecting dry weather and first flush discharges from the storm drain system to the sanitary sewer system as a stormwater pollutant control strategy.

g. Or as otherwise authorized by law.

The Discharger may request permit modification based on any of the circumstances described above. With any such request, the Discharger shall include antidegradation and anti-backsliding analyses.

2. Effluent Characterization Study and Report

a. Study Elements

The Discharger shall continue to characterize and evaluate the discharge to verify that the "no" or "cannot determine" reasonable potential analysis conclusions of this Order remain valid and to inform the next permit reissuance. The Discharger shall collect representative samples of the discharge at E-001 or E-002 as defined in the MRP at a minimum of once per calendar year.

The samples shall be analyzed for the priority pollutants listed in Table C of the Regional Standard Provisions (Attachment G), except for those priority pollutants with effluent limitations where the MRP already requires monitoring. Compliance with this requirement shall be achieved in accordance with the specifications of Regional Standard Provisions sections III.A.1 and III.A.2.

The Discharger shall evaluate on an annual basis if concentrations of any of these priority pollutants increase over past performance. The Discharger shall investigate the cause of any increase. The investigation may include, but need not be limited to, an increase in monitoring frequency, monitoring of internal process streams, and monitoring of influent sources. The Discharger shall establish remedial measures addressing any increase resulting in Reasonable Potential to cause or contribute to an excursion above applicable water quality objectives. This requirement may be satisfied through identification of the constituent as a "pollutant of concern" in the Discharger's Pollutant Minimization Program, described in Provision VI.C.3.

b. Reporting Requirements

i. Annual Reporting

The Discharger shall, within 30 days of receipt of analytical results, report in the transmittal letter for the appropriate annual self-monitoring report the following:

a. Indication that a sample or samples for this characterization study was or were collected; and

b. Identity of priority pollutants detected at or above applicable water quality criteria (see Fact Sheet [Attachment F] Table F-6 for the criteria), together with the detected concentrations of those pollutants.

ii. Final Report

The Discharger shall submit a final report that presents all these data to the Regional Water Board with the application for permit reissuance due January 31, 2017.

3. Best Management Practices and Pollutant Minimization Program

a. The Discharger shall continue to improve, in a manner acceptable to the Executive Officer, its existing Pollutant Minimization Program to promote minimization of pollutant loadings to the treatment plant and therefore to the receiving waters.

b. The Discharger shall submit an annual report, acceptable to the Executive Officer, no later than February 28 of each calendar year. Each annual report shall include at least the following information:

(1) *A brief description of the treatment plant, treatment plant processes and service area.*

(2) *A discussion of the current pollutants of concern.* Periodically, the Discharger shall analyze its own situation to determine which pollutants are currently a problem and which pollutants may be potential future problems. This discussion shall include the reasons for choosing the pollutants.

(3) *Identification of sources for the pollutants of concern*. This discussion shall include how the Discharger intends to estimate and identify sources of the pollutants. The Discharger shall also identify sources or potential sources not directly within the ability or authority of the Discharger to control, such as pollutants in the potable water supply and air deposition.

(4) *Identification of tasks to reduce the sources of the pollutants of concern.* This discussion shall identify and prioritize tasks to address the Discharger's pollutants of concern. The Discharger may implement the tasks by itself or participate in group, regional, or national tasks that will address its pollutants of concern. The Discharger is strongly encouraged to participate in group, regional, or national tasks that will address its pollutants of concern whenever it is efficient and

appropriate to do so. A time line shall be included for the implementation of each task.

(5) *Outreach to employees.* The Discharger shall inform employees about the pollutants of concern, potential sources, and how they might be able to help reduce the discharge of these pollutants of concern into the treatment facilities. The Discharger may provide a forum for employees to provide input.

(6) *Continuation of Public Outreach Program.* The Discharger shall prepare a public outreach program to communicate pollution prevention to its service area. Outreach may include participation in existing community events such as county fairs, initiating new community events such as displays and contests during Pollution Prevention Week, conducting school outreach programs, conducting plant tours, and providing public information in newspaper articles or advertisements, radio or television stories or spots, newsletters, utility bill inserts, and web site. Information shall be specific to the target audiences. The Discharger shall coordinate with other agencies as appropriate.

(7) *Discussion of criteria used to measure Pollutant Minimization Program and task effectiveness*. The Discharger shall establish criteria to evaluate the effectiveness of its Pollutant Minimization Program. This section shall discuss the specific criteria used to measure the effectiveness of each of the tasks in sections VI.C.3.b(3), (4), (5), and (6).

(8) *Documentation of efforts and progress.* This discussion shall detail all of the Discharger's Pollutant Minimization Program activities during the reporting year.

(9) *Evaluation of Pollutant Minimization Program and task effectiveness.* This Discharger shall use the criteria established in section VI.C.3.b.(7) to evaluate the Program's and tasks' effectiveness.

(10) *Identification of specific tasks and time schedules for future efforts.* Based on the evaluation, the Discharger shall detail how it intends to continue or change its tasks in order to more effectively reduce the amount of pollutants to the treatment plant, and subsequently in its effluent.

c. Pollutant Minimization Program for Pollutants with Effluent Limitations

The Discharger shall develop and conduct a Pollutant Minimization Program as further described below when there is evidence that a priority pollutant is present in the effluent above an effluent limitation (e.g., sample results reported as DNQ when the effluent limitation is less than the MDL, sample results from analytical methods more sensitive than those methods required by this Order, presence of whole effluent toxicity, health advisories for fish consumption, results of benthic or aquatic organism tissue sampling) and either:

(1) A sample result is reported as DNQ and the effluent limitation is less than the RL; or

(2) A sample result is reported as ND and the effluent limitation is less than the MDL, using SIP definitions.

d. Pollutant Minimization Program Submittals for Pollutants with Effluent Limitations

If triggered by the reasons in section VI.C.3.c, above, the Discharger's Pollutant Minimization Program shall include, but not be limited to, the following actions and submittals acceptable to the Regional Water Board:

(1) Annual review and semi-annual monitoring of potential sources of the reportable priority pollutants, which may include fish tissue monitoring and other bio-uptake sampling, or alternative measures approved by the Executive Officer when it is demonstrated that source monitoring is unlikely to produce useful analytical data;

(2) Quarterly monitoring for the reportable priority pollutants in the influent to the wastewater treatment system, or an alternative measures approved by the Executive Officer, when it is demonstrated that influent monitoring is unlikely to produce useful analytical data;

(3) Submittal of a control strategy designed to proceed toward the goal of maintaining concentrations of the reportable priority pollutants in the effluent at or below the effluent limitation;

(4) Implementation of appropriate cost-effective control measures for the reportable priority pollutants, consistent with the control strategy; and

(5) Annual report required by section VI.C.3.b above, shall specifically address the following items:

(a) All Pollutant Minimization Program monitoring results for the previous year;

(b) List of potential sources of the reportable priority pollutants;

(c) Summary of all actions undertaken pursuant to the control strategy; and

(d) Description of actions to be taken in the following year.

4. Special Provisions for POTWs

a. Pretreatment Program

The Discharger shall implement and enforce its approved pretreatment program in accordance with federal Pretreatment Regulations (40 CFR 403), pretreatment standards promulgated under CWA sections 307(b), 307(c), and 307(d), pretreatment requirements specified under 40 CFR 122.44(j), and the requirements in Attachment H, "Pretreatment Requirements." The Discharger's responsibilities include, but are not limited to:

(1) Enforcement of National Pretreatment Standards of 40 CFR 403.5 and 403.6;

(2) Implementation of its pretreatment program in accordance with legal authorities, policies, procedures, and financial provisions described in the National Pretreatment Program (40 CFR 403).

(3) Submission of reports to the State Water Board and the Regional Water Board as described in Attachment H, "Pretreatment Requirements."

(4) Evaluation of the need to revise local limits under 40 CFR 403.5(c)(1) and, within 180 days after the effective date of this Order, submission of a report acceptable to the Executive Officer describing the changes, with a plan and schedule for implementation. To ensure no significant increase in copper discharges, and thus compliance with anti-degradation requirements, the Discharger shall not consider eliminating or relaxing local limits for copper in this evaluation.

b. Biosolids Management Practices

(1) All biosolids shall be disposed of, managed or reused in a municipal solid waste landfill, through land application, as a Class A compost, through a waste to energy facility, or other recognized and approved technology, disposed of in a sludge-only landfill or fired in a sewage sludge incinerator in accordance with 40 CFR Part 503.

(2) Biosolids treatment, storage and disposal or reuse shall not create a nuisance, such as objectionable odors or flies, or result in groundwater contamination.

(3) The biosolids treatment and storage site shall have facilities adequate to divert surface runoff from adjacent areas, to protect boundaries of the site from erosion, and to prevent any conditions that would cause drainage from the materials in the temporary storage site. Adequate protection is defined as protection from at least a 100-year storm and protection from the highest possible tidal stage that may occur.

(4) Biosolids disposed of in a municipal solid waste landfill shall meet the requirements of 40 CFR Part 258. In the annual Self-Monitoring Report, the Discharger shall include the amount of biosolids disposed and the landfill to which it was sent.

(5) This Order does not authorize permanent onsite biosolids storage or disposal. A Report of Waste Discharge shall be filed and the site brought into compliance with all applicable regulations prior to commencement of any such activity.

c. Sanitary Sewer Overflows and Sewer System Management Plan

The Discharger's force mains are part of the Facility subject to this Order. As such, the Discharger shall properly operate and maintain its force mains (Attachment D, Federal Standard Provisions—Permit Compliance, subsection I.D). The Discharger shall report any noncompliance (Attachment D, Federal Standard Provision—Reporting, subsections V.E.1 and V.E.2) and mitigate any discharge from the Discharger's force mains in violation of this Order (Attachment D, Federal Standard Provisions—Permit Compliance, subsection I.C).

5. Other Special Provisions

a. Specific Tasks to Reduce Blending

The Discharger shall implement the following tasks to reduce blending:

Table 8. Specific Tasks to Reduce Blending

Task	Compliance Date
1. **Evaluate Effectiveness of Wet Weather Improvement Program.** The Discharger shall evaluate and report on the effectiveness of its recently completed Wet Weather Improvement Program. The evaluation shall at a minimum consist of a table showing a summary of pre-Improvement Program data. The table shall be updated annually with the current year's data. The data shall include at a minimum (1) volume and duration of individual blending events, and (2) rainfall data for each of these blending events.	Annually, with Annual Self-Monitoring Report due February 1
2. **Report Progress on Private Sewer Lateral Programs.** The Discharger shall report any trends in the number and length of private sewer laterals replaced or repaired, and significant changes to existing private sewer lateral programs by its tributary collection system agencies in the Discharger's service area. This shall be based on data the Discharger obtains from its tributary collection system agencies.	Annually, with Annual Self-Monitoring Report due February 1
3. **Monitor Influent Flow From Tributary Collection Systems.** Beginning November 2012, the Discharger shall monitor flows from each tributary collection system agency to quantify infiltration and inflow (I/I) entering the Plant. The Discharger shall report electronically (such as with Excel) average daily and maximum hourly flows from each tributary collection system for each day.	Annually, with Annual Self-Monitoring Report due February 1
4. **Describe Status of Capital Improvement Programs of Tributary Collection System Agencies.** The Discharger shall request information from all tributary collection system agencies regarding existing and future capital improvement activities intended to reduce I/I. The Discharger shall annually report the information it receives. If, based on this information, the Discharger concludes that a tributary collection system agency is not making adequate improvements to reduce the need to blend, the Discharger shall note this conclusion in its annual report and work with that agency to encourage performance improvement. The Discharger shall describe its efforts to encourage improvement in its reports.	Annually, with Annual Self-Monitoring Report due February 1
5. **Consider Flow-Based Rate Structure.** The Discharger shall develop a flow-based rate structure that more accurately accounts for costs of treating and managing excess I/I flows from its tributary collection system agencies (charges are currently based on equivalent-dwelling units) and present this proposal to its Board of Directors for consideration.	August 1, 2013

Task	Compliance Date
6. Summarize Effectiveness of Wet Weather Improvement Program and Private Sewer Lateral Programs Performance. The Discharger shall re-evaluate the Wet Weather Improvement Program and the Private Sewer Lateral Programs based on data collected in tasks 1, 2, 3, and 4, and report its findings.	July 15, 2016
7. Update Capital Master Planning Alternatives Analysis for Blending Reduction. The Discharger shall update its capital master planning alternatives analysis for blending reduction to re-evaluate strategies to further reduce blending through capital improvements to the tributary collection systems (based on information received under Task 4, above), and at the Facility. The Discharger shall consider the current status of tributary collection system agency efforts to reduce I/I by requesting information from each tributary collection system agency regarding its efforts, including its budgets and expenditures. Based on the information provided, the Discharger shall identify a preferred alternative to further reduce blending. Selection shall be based on factors including, but not necessarily limited to, the need to blend (considering the effectiveness of the existing Wet Weather Improvement Program and the private sewer lateral programs), the alternative's foreseeable impact on the need to blend, and the alternative's estimated cost relative to the Discharger's and tributary collection systems agencies' abilities to finance the costs. (One means to assess a community's ability to fund wet weather improvements is to consult USEPA's *CSO Guidance for Financial Capability Assessment and Schedule Development*, EPA Publication Number 832-B-97-004.) The report shall include a feasible timeline for steps leading to implementation of the preferred alternative.	With Report of Waste Discharge due January 31, 2017
8. Prepare No Feasible Alternatives Analysis. The Discharger shall conduct a utility analysis if it seeks to continue to bypass peak wet weather flows around the secondary treatment units based on 40 CFR 122.41(m)(4)(i)(A)-(C). The utility analysis shall contain all elements described in USEPA's proposed guidance *NPDES Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plants Serving Separate Sanitary Sewer Collection Systems* (December 2005, or the most recent version).	With Report of Waste Discharge due January 31, 2017
9. Develop and Implement Public Notification Protocol. The Discharger shall develop and implement a public notification protocol to alert the public of blending events. The protocol shall provide a mechanism to notify the public within 24 hours of the start of a blending incident and provide an approximate duration and volume for the incident within 48 hours of it ending. The mechanism could involve, for example, Web site posting or emailing a list of parties who have expressed interest in this information. The Discharger shall submit the protocol to the Regional Water Board.	September 1, 2012

b. Copper Action Plan

The Discharger shall implement pretreatment, source control, and pollution prevention for copper in accordance with the following tasks and time schedule.

Table 9. Copper Action Plan

Task	Compliance Date
1. Review Potential Copper Sources The Discharger shall submit an inventory of potential copper sources to the treatment plant.	Completed
2. Implement Copper Control Program The Discharger shall submit a plan for and begin implementation of a program to reduce copper sources identified in Task 1. For publicly owned treatment works, the plan shall consist, at a minimum, of the following elements: a. Provide education and outreach to the public (e.g., focus on proper pool and spa maintenance and plumbers' roles in reducing corrosion). b. If corrosion is determined to be a significant copper source, work cooperatively with local water purveyors to reduce and control water corrosivity, as appropriate, and ensure that local plumbing contractors implement best management practices to reduce corrosion in pipes. c. Educate plumbers, designers, and maintenance contractors for pools and spas to encourage best management practices that minimize copper discharges.	Completed
3. Implement Additional Measures If the Regional Water Board notifies the Discharger that the three-year rolling mean dissolved copper concentration of the receiving water exceeds 2.2 µg/L, then within 90 days of the notification, the Discharger shall evaluate its effluent copper concentration trend, and if it is increasing, develop and begin implementation of additional measures to control copper discharges. The Discharger shall report on the progress and effectiveness of actions taken, together with a schedule for actions to be taken in the next 12 months.	With next annual pollution prevention report due February 28 (at least 90 days following notification)
4. Undertake Studies to Reduce Copper Pollutant Impact Uncertainties The Discharger shall submit an updated study plan and schedule to conduct, or cause to be conducted, technical studies to investigate possible copper sediment toxicity and technical studies to investigate sublethal effects on salmonids. Specifically, the Discharger shall include the manner in which the above will be accomplished and describe the studies to be performed with an implementation schedule. To satisfy this requirement, dischargers may collaborate and conduct these studies as a group.	Completed
5. Report Status of Copper Control Program The Discharger shall submit an annual report documenting copper control program implementation and addressing the effectiveness of the actions taken, including any additional copper controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months. Additionally, the Discharger shall report the findings and results of the studies completed, planned, or in progress under Task 4. Regarding the Task 4 studies, dischargers may collaborate and provide this information in a single report to satisfy this requirement for an entire group.	With annual pollution prevention report due February 28, 2013

c. Cyanide Action Plan

The Discharger shall implement monitoring and surveillance, pretreatment, source control and pollution prevention for cyanide in accordance with the following tasks and time schedule.

Table 10. Cyanide Action Plan

Task	Compliance Date
1. Review Potential Cyanide Sources The Discharger shall submit an inventory of potential cyanide sources to the treatment plant. If no cyanide sources are identified, Tasks 2 and 3 are not required, unless the Discharger receives a request to discharge detectable levels of cyanide to the sewer. If so, the Discharger shall notify the Executive Officer and implement Tasks 2 and 3.	Completed

Task	Compliance Date
2. Implement Cyanide Control Program The Discharger shall submit a plan and begin implementation of a program to minimize cyanide discharges to its treatment plant consisting, at a minimum, of the following elements: a. Inspect each potential source to assess the need to include that contributing source in the control program. b. Inspect contributing sources included in the control program annually. Inspection elements may be based on USEPA guidance, such as Industrial User Inspection and Sampling Manual for POTWs (EPA 831-B-94-01). c. Develop and distribute educational materials to contributing sources and potential contributing sources regarding the need to prevent cyanide discharges. d. Prepare an emergency monitoring and response plan to be implemented if a significant cyanide discharge occurs. For purposes of this Order, a "significant cyanide discharge" is occurring if cyanide is found in the plant's influent above 10 µg/L.	With annual pollution prevention report due February 28, 2013
3. Implement Additional Cyanide Control Measures If the Regional Water Board notifies the Discharger that ambient monitoring shows cyanide concentrations are 1.0 µg/L or higher in the main body of San Francisco Bay, then within 90 days of the notification, the Discharger shall commence actions to identify and abate cyanide sources responsible for the elevated ambient concentrations, and shall report on the progress and effectiveness of actions taken, together with a schedule for actions to be taken in the next 12 months.	With next annual pollution prevention report due February 28 (at least 90 days following notification)
4. Report Status of Cyanide Control Program The Discharger shall submit an annual report documenting cyanide control program implementation and addressing the effectiveness of actions taken, including any additional cyanide controls required by Task 3, above, together with a schedule for actions to be taken in the next 12 months.	With annual pollution prevention report due February 28 each year

d. Fats, Oils, and Grease

If the Discharger receives fats, oil, and grease, or food processing waste, for injection into an anaerobic digester, the Discharger shall develop and implement standard operating procedures (SOPs) for this activity. The SOPs shall address spill prevention; spill response; introduction of materials that could cause interference, pass through, or upset the treatment processes; vector control; and operation and maintenance. The Discharger shall provide training to its staff on the SOPs and shall maintain records onsite for at least three years for each load received, describing the hauler, waste type, and amount.

VII. COMPLIANCE DETERMINATION

Compliance with effluent limitations for priority pollutants shall be determined using sample reporting protocols defined in Attachment A—Definitions, the MRP (Attachment E), Fact Sheet section VI, and the Regional Standard Provisions (Attachment G). For purposes of reporting and administrative enforcement by the Regional and State Water Boards, the Discharger shall be deemed out of compliance with effluent limitations if the concentration of the priority pollutant in the monitoring sample is greater than the effluent limitation and greater than or equal to the reporting level (RL).

ATTACHMENT A – DEFINITIONS

Arithmetic Mean (μ)
Also called the average, is the sum of measured values divided by the number of samples. For ambient water concentrations, the arithmetic mean is calculated as follows:

Arithmetic mean = $\mu = \Sigma x / n$ where: Σx is the sum of the measured ambient water concentrations, and n is the number of samples.

Average Monthly Effluent Limitation (AMEL)
The highest allowable average of daily discharges over a calendar month, calculated as the sum of all daily discharges measured during a calendar month divided by the number of daily discharges measured during that month.

Average Weekly Effluent Limitation (AWEL)
The highest allowable average of daily discharges over a calendar week (Sunday through Saturday), calculated as the sum of all daily discharges measured during a calendar week divided by the number of daily discharges measured during that week.

Bioaccumulative
Those substances taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

Carcinogenic
Carcinogenic pollutants are substances that are known to cause cancer in living organisms.

Coefficient of Variation (*CV*)
CV is a measure of the data variability and is calculated as the estimated standard deviation divided by the arithmetic mean of the observed values.

Daily Discharge
Daily Discharge is defined as either: (1) the total mass of the constituent discharged over the calendar day (12:00 am through 11:59 pm) or any 24-hour period that reasonably represents a calendar day for purposes of sampling (as specified in this Order), for a constituent with limitations expressed in units of mass or; (2) the unweighted arithmetic mean measurement of the constituent over the day for a constituent with limitations expressed in other units of measurement (e.g., concentration).

The daily discharge may be determined by the analytical results of a composite sample taken over the course of one day (a calendar day or other 24-hour period defined as a day) or by the arithmetic mean of analytical results from one or more grab samples taken over the course of the day. For composite sampling, if 1 day is defined as a 24-hour period other than a calendar day, the analytical result for the 24-hour period will be considered as the result for the calendar day in which the 24-hour period ends.

Detected, but Not Quantified (DNQ)
DNQ are those sample results less than the RL, but greater than or equal to the laboratory's MDL.

Dilution Credit
Dilution Credit is the amount of dilution granted to a discharge in the calculation of a water quality-based effluent limitation, based on the allowance of a specified mixing zone. It is calculated from the

dilution ratio or determined through conducting a mixing zone study or modeling of the discharge and receiving water.

Effluent Concentration Allowance (ECA)
ECA is a value derived from the water quality criterion/objective, dilution credit, and ambient background concentration that is used, in conjunction with the coefficient of variation for the effluent monitoring data, to calculate a long-term average (LTA) discharge concentration. The ECA has the same meaning as waste load allocation (WLA) as used in USEPA guidance (Technical Support Document For Water Quality-based Toxics Control, March 1991, second printing, EPA/505/2-90-001).

Enclosed Bays
Enclosed Bays means indentations along the coast that enclose an area of oceanic water within distinct headlands or harbor works. Enclosed bays include all bays where the narrowest distance between the headlands or outermost harbor works is less than 75 percent of the greatest dimension of the enclosed portion of San Francisco Bay. Enclosed bays include, but are not limited to, Humboldt Bay, Bodega Harbor, Tomales Bay, Drake's Estero, San Francisco Bay, Morro Bay, Los Angeles-Long Beach Harbor, Upper and Lower Newport Bay, Mission Bay, and San Diego Bay. Enclosed bays do not include inland surface waters or ocean waters.

Estimated Chemical Concentration
The estimated chemical concentration that results from the confirmed detection of the substance by the analytical method below the ML value.

Estuaries
Estuaries means waters, including coastal lagoons, located at the mouths of streams that serve as areas of mixing for fresh and ocean waters. Coastal lagoons and mouths of streams that are temporarily separated from the ocean by sandbars shall be considered estuaries. Estuarine waters shall be considered to extend from a bay or the open ocean to a point upstream where there is no significant mixing of fresh water and seawater. Estuarine waters include, but are not limited to, the Sacramento-San Joaquin Delta, as defined in California Water Code section 12220, Suisun Bay, Carquinez Strait downstream to the Carquinez Bridge, and appropriate areas of the Smith, Mad, Eel, Noyo, Russian, Klamath, San Diego, and Otay rivers. Estuaries do not include inland surface waters or ocean waters.

Inland Surface Waters
All surface waters of the State that do not include the ocean, enclosed bays, or estuaries.

Instantaneous Maximum Effluent Limitation
The highest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous maximum limitation).

Instantaneous Minimum Effluent Limitation
The lowest allowable value for any single grab sample or aliquot (i.e., each grab sample or aliquot is independently compared to the instantaneous minimum limitation).

Maximum Daily Effluent Limitation (MDEL)
The highest allowable daily discharge of a pollutant, over a calendar day (or 24-hour period). For pollutants with limitations expressed in units of mass, the daily discharge is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of

measurement, the daily discharge is calculated as the arithmetic mean measurement of the pollutant over the day.

Median
The middle measurement in a set of data. The median of a set of data is found by first arranging the measurements in order of magnitude (either increasing or decreasing order). If the number of measurements (n) is odd, then the median = $X_{(n+1)/2}$. If n is even, then the median = $(X_{n/2} + X_{(n/2)+1})/2$ (i.e., the midpoint between the $n/2$ and $n/2+1$).

Method Detection Limit (MDL)
MDL is the minimum concentration of a substance that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero, as defined in title 40 of the Code of Federal Regulations (40 CFR), Part 136, Attachment B, revised as of July 3, 1999.

Minimum Level (ML)
ML is the concentration at which the entire analytical system must give a recognizable signal and acceptable calibration point. The ML is the concentration in a sample that is equivalent to the concentration of the lowest calibration standard analyzed by a specific analytical procedure, assuming that all the method specified sample weights, volumes, and processing steps have been followed.

Mixing Zone
Mixing Zone is a limited volume of receiving water that is allocated for mixing with a wastewater discharge where water quality criteria can be exceeded without causing adverse effects to the overall water body.

Not Detected (ND)
Sample results less than the laboratory's MDL.

Ocean Waters
The territorial marine waters of the State as defined by California law to the extent these waters are outside of enclosed bays, estuaries, and coastal lagoons. Discharges to ocean waters are regulated in accordance with the State Water Board's California Ocean Plan.

Persistent Pollutants
Persistent pollutants are substances for which degradation or decomposition in the environment is nonexistent or very slow.

Pollutant Minimization Program (PMP)
PMP means waste minimization and pollution prevention actions that include, but are not limited to, product substitution, waste stream recycling, alternative waste management methods, and education of the public and businesses. The goal of the PMP shall be to reduce all potential sources of a priority pollutant(s) through pollutant minimization (control) strategies, including pollution prevention measures as appropriate, to maintain the effluent concentration at or below the water quality-based effluent limitation. Pollution prevention measures may be particularly appropriate for persistent bioaccumulative priority pollutants where there is evidence that beneficial uses are being impacted. The Regional Water Board may consider cost effectiveness when establishing the requirements of a PMP. The completion and implementation of a Pollution Prevention Plan, if required pursuant to California Water Code section 13263.3(d), shall be considered to fulfill the PMP requirements.

Pollution Prevention

Pollution Prevention means any action that causes a net reduction in the use or generation of a hazardous substance or other pollutant that is discharged into water and includes, but is not limited to, input change, operational improvement, production process change, and product reformulation (as defined in California Water Code section 13263.3). Pollution prevention does not include actions that merely shift a pollutant in wastewater from one environmental medium to another environmental medium, unless clear environmental benefits of such an approach are identified to the satisfaction of the State or Regional Water Board.

Reporting Level (RL)

RL is the ML (and its associated analytical method) chosen by the Discharger for reporting and compliance determination from the MLs included in this Order. The MLs included in this Order correspond to approved analytical methods for reporting a sample result that are selected by the Regional Water Board either from Appendix 4 of the SIP in accordance with section 2.4.2 of the SIP or established in accordance with section 2.4.3 of the SIP. The ML is based on the proper application of method-based analytical procedures for sample preparation and the absence of any matrix interferences. Other factors may be applied to the ML depending on the specific sample preparation steps employed. For example, the treatment typically applied in cases where there are matrix-effects is to dilute the sample or sample aliquot by a factor of ten. In such cases, this additional factor must be applied to the ML in the computation of the RL.

Satellite Collection System

The portion, if any, of a sanitary sewer system owned or operated by a different public agency than the agency that owns and operates the wastewater treatment facility that a sanitary sewer system is tributary to.

Source of Drinking Water

Any water designated as municipal or domestic supply (MUN) in a Regional Water Board Basin Plan.

Standard Deviation (σ)

Standard Deviation is a measure of variability that is calculated as follows:

$$\sigma = (\sum[(x - \mu)^2]/(n - 1))^{0.5}$$

where:

x is the observed value;
μ is the arithmetic mean of the observed values; and
n is the number of samples.

Toxicity Reduction Evaluation (TRE)

TRE is a study conducted in a step-wise process designed to identify the causative agents of effluent or ambient toxicity, isolate the sources of toxicity, evaluate the effectiveness of toxicity control options, and then confirm the reduction in toxicity. The first steps of the TRE consist of the collection of data relevant to the toxicity, including additional toxicity testing, and an evaluation of facility operations and maintenance practices, and best management practices. A Toxicity Identification Evaluation (TIE) may be required as part of the TRE, if appropriate. (A TIE is a set of procedures to identify the specific chemical(s) responsible for toxicity. These procedures are performed in three phases (characterization, identification, and confirmation) using aquatic organism toxicity tests.)

ATTACHMENT B – FACILITY MAP

Figure B-1. Facility Location

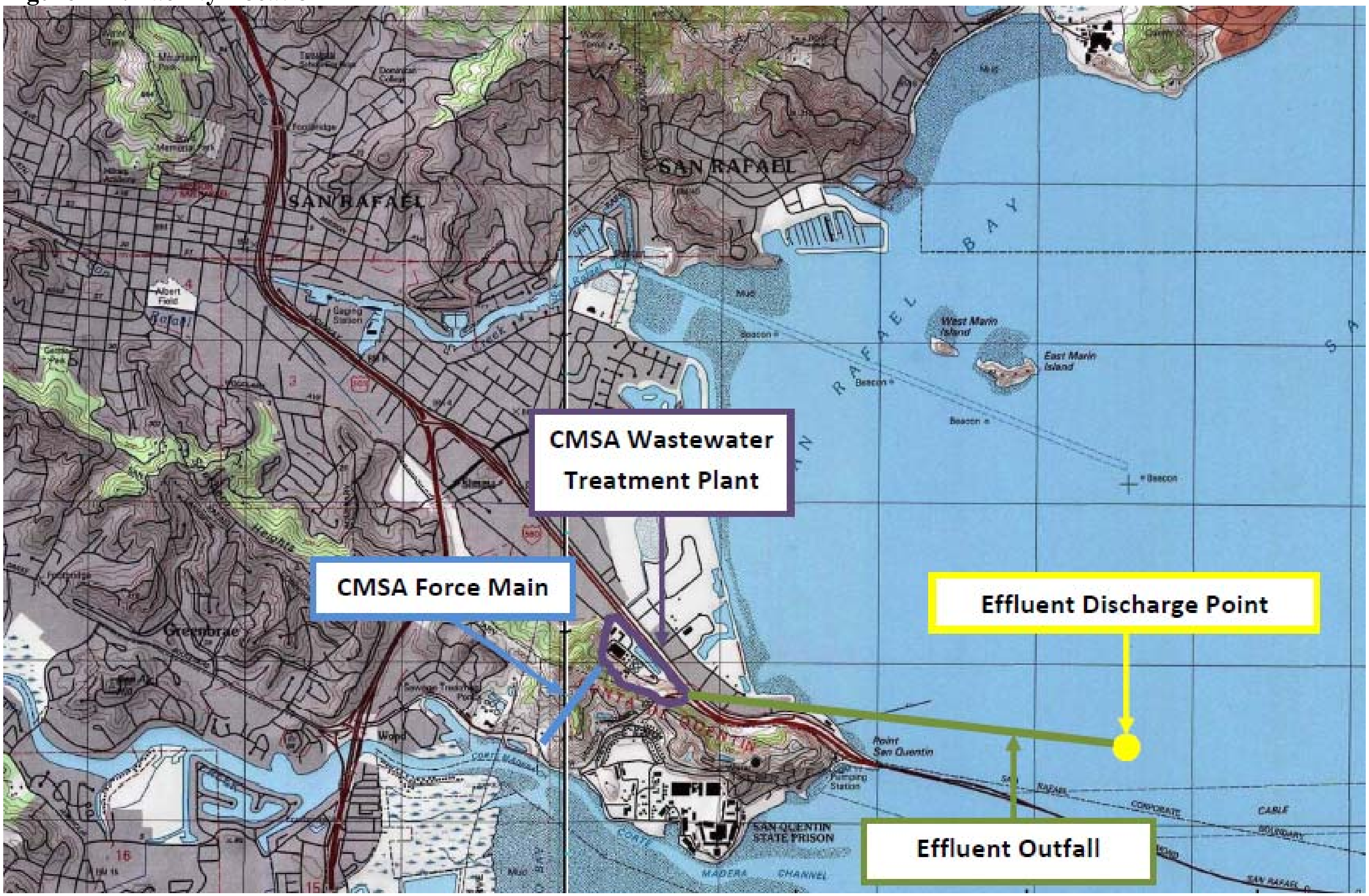
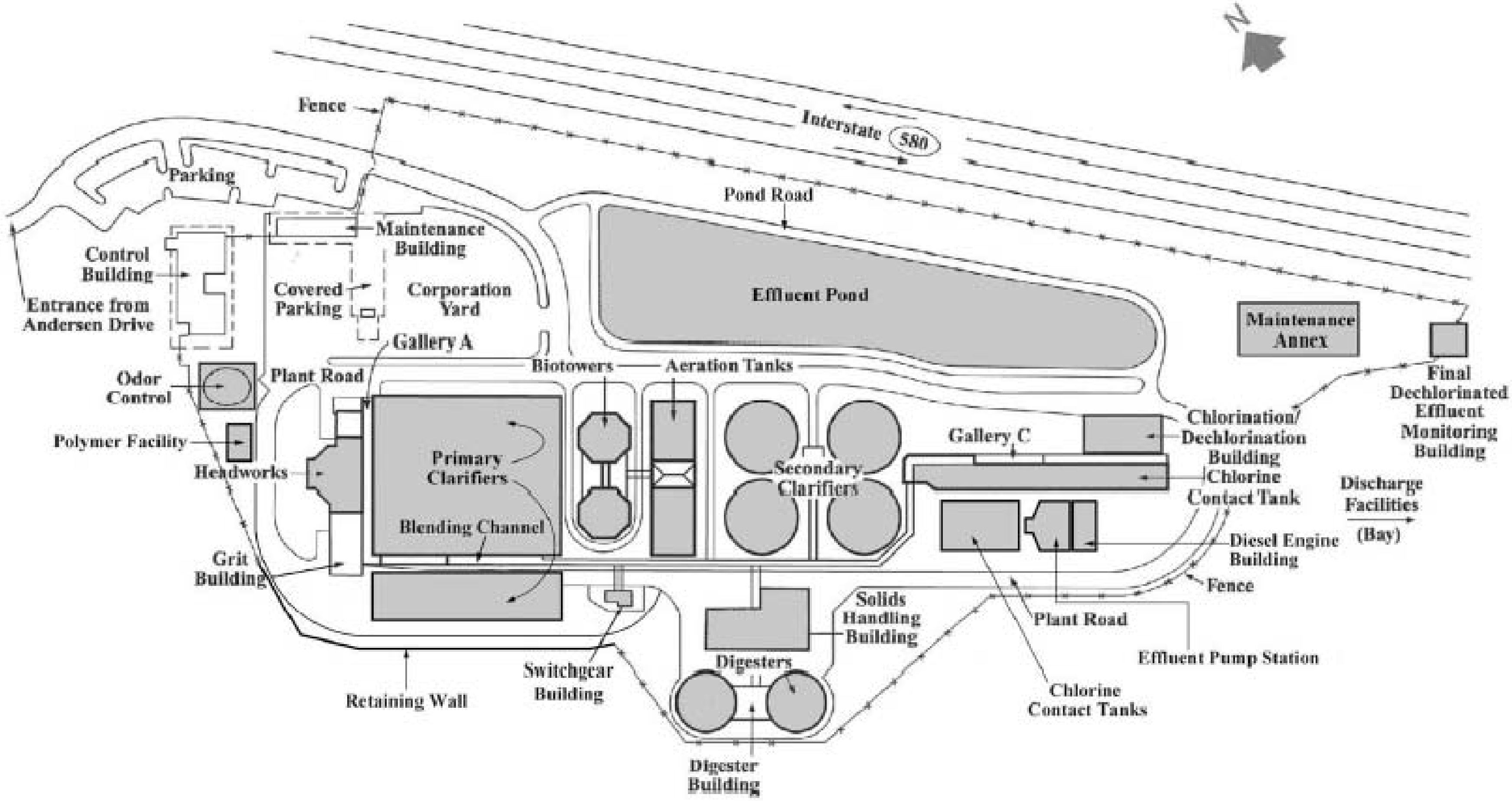
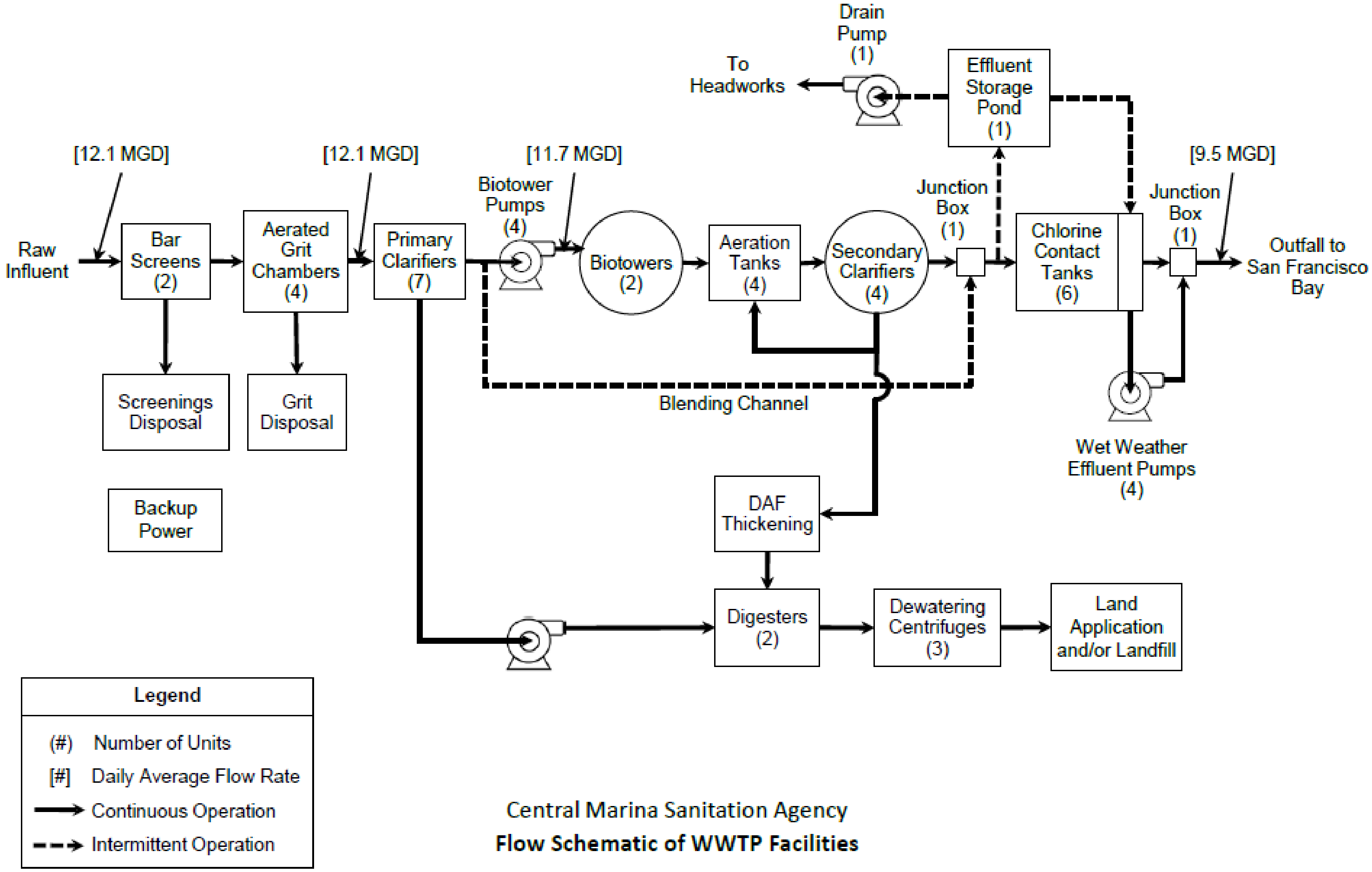


Figure B-2. Facility Processes Map



ATTACHMENT C – PROCESS FLOW DIAGRAM

Figure C-1. Process Flow Diagram



ATTACHMENT D –STANDARD PROVISIONS

I. STANDARD PROVISIONS – PERMIT COMPLIANCE

A. Duty to Comply

1. The Discharger must comply with all of the conditions of this Order. Any noncompliance constitutes a violation of the Clean Water Act (CWA) and the California Water Code and is grounds for enforcement action, for permit termination, revocation and reissuance, or modification; or denial of a permit renewal application. (40 CFR 122.41(a)).

2. The Discharger shall comply with effluent standards or prohibitions established under section 307(a) of the CWA for toxic pollutants and with standards for sewage sludge use or disposal established under section 405(d) of the CWA within the time provided in the regulations that establish these standards or prohibitions, even if this Order has not yet been modified to incorporate the requirement. (40 CFR 122.41(a)(1)).

B. Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for a Discharger in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this Order. (40 CFR 122.41(c).)

C. Duty to Mitigate

The Discharger shall take all reasonable steps to minimize or prevent any discharge or sludge use or disposal in violation of this Order that has a reasonable likelihood of adversely affecting human health or the environment. (40 CFR 122.41(d).)

D. Proper Operation and Maintenance

The Discharger shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the Discharger to achieve compliance with the conditions of this Order. Proper operation and maintenance also includes adequate laboratory controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems that are installed by a Discharger only when necessary to achieve compliance with the conditions of this Order (40 CFR 122.41(e)).

E. Property Rights

1. This Order does not convey any property rights of any sort or any exclusive privileges. (40 CFR 122.41(g).)

2. The issuance of this Order does not authorize any injury to persons or property or invasion of other private rights, or any infringement of state or local law or regulations. (40 CFR 122.5(c).)

F. Inspection and Entry

The Discharger shall allow the Regional Water Board, State Water Board, United States Environmental Protection Agency (USEPA), and/or their authorized representatives (including an authorized contractor acting as their representative), upon the presentation of credentials and other documents, as may be required by law, to (40 CFR 122.41(i); Wat. Code, § 13383):

1. Enter upon the Discharger's premises where a regulated facility or activity is located or conducted, or where records are kept under the conditions of this Order (40 CFR 122.41(i)(1));

2. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Order (40 CFR 122.41(i)(2));

3. Inspect and photograph, at reasonable times, any facilities, equipment (including monitoring and control equipment), practices, or operations regulated or required under this Order (40 CFR 122.41(i)(3)); and

4. Sample or monitor, at reasonable times, for the purposes of assuring Order compliance or as otherwise authorized by the CWA or the Water Code, any substances or parameters at any location. (40 CFR 122.41(i)(4).)

G. Bypass

1. Definitions

   a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. (40 CFR 122.41(m)(1)(i).)

   b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities, which causes them to become inoperable, or substantial and permanent loss of natural resources that can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. (40 CFR 122.41(m)(1)(ii).)

2. Bypass not exceeding limitations. The Discharger may allow any bypass to occur which does not cause exceedances of effluent limitations, but only if it is for essential maintenance to assure efficient operation. These bypasses are not subject to the provisions listed in Standard Provisions – Permit Compliance I.G.3, I.G.4, and I.G.5 below. (40 CFR 122.41(m)(2).)

3. Prohibition of bypass. Bypass is prohibited, and the Regional Water Board may take enforcement action against a Discharger for bypass, unless (40 CFR 122.41(m)(4)(i)):

   a. Bypass was unavoidable to prevent loss of life, personal injury, or severe property damage (40 CFR 122.41(m)(4)(i)(A));

   b. There were no feasible alternatives to the bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass that occurred during normal periods of equipment downtime or preventive maintenance (40 CFR 122.41(m)(4)(i)(B)); and

c. The Discharger submitted notice to the Regional Water Board as required under Standard Provisions – Permit Compliance I.G.5 below. (40 CFR 122.41(m)(4)(i)(C).)

4. The Regional Water Board may approve an anticipated bypass, after considering its adverse effects, if the Regional Water Board determines that it will meet the three conditions listed in Standard Provisions – Permit Compliance I.G.3 above. (40 CFR 122.41(m)(4)(ii).)

5. Notice

   a. Anticipated bypass. If the Discharger knows in advance of the need for a bypass, it shall submit a notice, if possible at least 10 days before the date of the bypass. (40 CFR 122.41(m)(3)(i).)

   b. Unanticipated bypass. The Discharger shall submit notice of an unanticipated bypass as required in Standard Provisions - Reporting V.E below (24-hour notice). (40 CFR 122.41(m)(3)(ii).)

H. Upset

Upset means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limitations because of factors beyond the reasonable control of the Discharger. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation. (40 CFR 122.41(n)(1).)

1. Effect of an upset. An upset constitutes an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the requirements of Standard Provisions – Permit Compliance I.H.2 below are met. No determination made during administrative review of claims that noncompliance was caused by upset, and before an action for noncompliance, is final administrative action subject to judicial review. (40 CFR 122.41(n)(2).).

2. Conditions necessary for a demonstration of upset. A Discharger who wishes to establish the affirmative defense of upset shall demonstrate, through properly signed, contemporaneous operating logs or other relevant evidence that (40 CFR 122.41(n)(3)):

   a. An upset occurred and that the Discharger can identify the cause(s) of the upset (40 CFR 122.41(n)(3)(i));

   b. The permitted facility was, at the time, being properly operated (40 CFR 122.41(n)(3)(ii));

   c. The Discharger submitted notice of the upset as required in Standard Provisions – Reporting V.E.2.b below (24-hour notice) (40 CFR 122.41(n)(3)(iii)); and

   d. The Discharger complied with any remedial measures required under Standard Provisions – Permit Compliance I.C above. (40 CFR 122.41(n)(3)(iv).)

3. Burden of proof. In any enforcement proceeding, the Discharger seeking to establish the occurrence of an upset has the burden of proof. (40 CFR 122.41(n)(4).)

II. STANDARD PROVISIONS – PERMIT ACTION

A. General

This Order may be modified, revoked and reissued, or terminated for cause. The filing of a request by the Discharger for modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated noncompliance does not stay any Order condition. (40 CFR 122.41(f).)

B. Duty to Reapply

If the Discharger wishes to continue an activity regulated by this Order after the expiration date of this Order, the Discharger must apply for and obtain a new permit. (40 CFR 122.41(b).)

C. Transfers

This Order is not transferable to any person except after notice to the Regional Water Board. The Regional Water Board may require modification or revocation and reissuance of this Order to change the name of the Discharger and incorporate such other requirements as may be necessary under the CWA and the Water Code. (40 CFR 122.41(l)(3); 122.61.)

III. STANDARD PROVISIONS – MONITORING

A. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity. (40 CFR 122.41(j)(1).)

B. Monitoring results must be conducted according to test procedures under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503 unless other test procedures have been specified in this Order. (40 CFR 122.41(j)(4); 122.44(i)(1)(iv).)

IV. STANDARD PROVISIONS – RECORDS

A. Except for records of monitoring information required by this Order related to the Discharger's sewage sludge use and disposal activities, which shall be retained for a period of at least five years (or longer as required by Part 503), the Discharger shall retain records of all monitoring information, including all calibration and maintenance records and all original strip chart recordings for continuous monitoring instrumentation, copies of all reports required by this Order, and records of all data used to complete the application for this Order, for a period of at least three (3) years from the date of the sample, measurement, report or application. This period may be extended by request of the Regional Water Board Executive Officer at any time. (40 CFR 122.41(j)(2).)

B. Records of monitoring information shall include:

1. The date, exact place, and time of sampling or measurements (40 CFR 122.41(j)(3)(i));

2. The individual(s) who performed the sampling or measurements (40 CFR 122.41(j)(3)(ii));

3. The date(s) analyses were performed (40 CFR 122.41(j)(3)(iii));

4. The individual(s) who performed the analyses (40 CFR 122.41(j)(3)(iv));

5. The analytical techniques or methods used (40 CFR 122.41(j)(3)(v)); and

6. The results of such analyses. (40 CFR 122.41(j)(3)(vi).)

C. Claims of confidentiality for the following information will be denied (40 CFR 122.7(b)):

1. The name and address of any permit applicant or Discharger (40 CFR 122.7(b)(1)); and

2. Permit applications and attachments, permits and effluent data. (40 CFR 122.7(b)(2).)

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information

The Discharger shall furnish to the Regional Water Board, State Water Board, or USEPA within a reasonable time, any information which the Regional Water Board, State Water Board, or USEPA may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this Order or to determine compliance with this Order. Upon request, the Discharger shall also furnish to the Regional Water Board, State Water Board, or USEPA copies of records required to be kept by this Order. (40 CFR 122.41(h); Wat. Code, § 13267.)

B. Signatory and Certification Requirements

1. All applications, reports, or information submitted to the Regional Water Board, State Water Board, and/or USEPA shall be signed and certified in accordance with Standard Provisions – Reporting V.B.2, V.B.3, V.B.4, and V.B.5 below. (40 CFR 122.41(k).)

2. All permit applications shall be signed by either a principal executive officer or ranking elected official. For purposes of this provision, a principal executive officer of a federal agency includes: (i) the chief executive officer of the agency, or (ii) a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of USEPA). (40 CFR 122.22(a)(3).).

3. All reports required by this Order and other information requested by the Regional Water Board, State Water Board, or USEPA shall be signed by a person described in Standard Provisions – Reporting V.B.2 above, or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Standard Provisions – Reporting V.B.2 above (40 CFR 122.22(b)(1));

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position.) (40 CFR 122.22(b)(2)); and

c. The written authorization is submitted to the Regional Water Board and State Water Board. (40 CFR 122.22(b)(3).)

4. If an authorization under Standard Provisions – Reporting V.B.3 above is no longer accurate because a different individual or position has responsibility for the overall operation of the facility, a new authorization satisfying the requirements of Standard Provisions – Reporting V.B.3 above must be submitted to the Regional Water Board and State Water Board prior to or together with any reports, information, or applications, to be signed by an authorized representative. (40 CFR 122.22(c).)

5. Any person signing a document under Standard Provisions – Reporting V.B.2 or V.B.3 above shall make the following certification:

   "I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations." (40 CFR 122.22(d).)

C. Monitoring Reports

1. Monitoring results shall be reported at the intervals specified in the Monitoring and Reporting Program (Attachment E) in this Order. (40 CFR 122.22(l)(4).)

2. Monitoring results must be reported on a Discharge Monitoring Report (DMR) form or forms provided or specified by the Regional Water Board or State Water Board for reporting results of monitoring of sludge use or disposal practices. (40 CFR 122.41(l)(4)(i).)

3. If the Discharger monitors any pollutant more frequently than required by this Order using test procedures approved under Part 136 or, in the case of sludge use or disposal, approved under Part 136 unless otherwise specified in Part 503, or as specified in this Order, the results of this monitoring shall be included in the calculation and reporting of the data submitted in the DMR or sludge reporting form specified by the Regional Water Board. (40 CFR 122.41(l)(4)(ii).)

4. Calculations for all limitations, which require averaging of measurements, shall utilize an arithmetic mean unless otherwise specified in this Order. (40 CFR 122.41(l)(4)(iii).)

D. Compliance Schedules

Reports of compliance or noncompliance with, or any progress reports on, interim and final requirements contained in any compliance schedule of this Order, shall be submitted no later than 14 days following each schedule date. (40 CFR 122.41(l)(5).)

E. Twenty-Four Hour Reporting

1. The Discharger shall report any noncompliance that may endanger health or the environment. Any information shall be provided orally within 24 hours from the time the Discharger becomes aware of the circumstances. A written submission shall also be provided within five (5) days of the time the Discharger becomes aware of the circumstances. The written submission shall contain a description of the noncompliance and its cause; the period of noncompliance, including exact dates and times, and if the noncompliance has not been corrected, the anticipated time it is expected to continue; and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance. (40 CFR 122.41(l)(6)(i).)

2. The following shall be included as information that must be reported within 24 hours under this paragraph (40 CFR 122.41(l)(6)(ii)):

   a. Any unanticipated bypass that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(A).)

   b. Any upset that exceeds any effluent limitation in this Order. (40 CFR 122.41(l)(6)(ii)(B).)

3. The Regional Water Board may waive the above-required written report under this provision on a case-by-case basis if an oral report has been received within 24 hours. (40 CFR 122.41(l)(6)(iii).)

F. Planned Changes

The Discharger shall give notice to the Regional Water Board as soon as possible of any planned physical alterations or additions to the permitted facility. Notice is required under this provision only when (40 CFR 122.41(l)(1)):

1. The alteration or addition to a permitted facility may meet one of the criteria for determining whether a facility is a new source in section 122.29(b) (40 CFR 122.41(l)(1)(i)); or

2. The alteration or addition could significantly change the nature or increase the quantity of pollutants discharged. This notification applies to pollutants that are not subject to effluent limitations in this Order. (40 CFR 122.41(l)(1)(ii).)

3. The alteration or addition results in a significant change in the Discharger's sludge use or disposal practices, and such alteration, addition, or change may justify the application of permit conditions that are different from or absent in the existing permit, including notification of additional use or disposal sites not reported during the permit application process or not reported pursuant to an approved land application plan. (40 CFR 122.41(l)(1)(iii).)

G. Anticipated Noncompliance

The Discharger shall give advance notice to the Regional Water Board or State Water Board of any planned changes in the permitted facility or activity that may result in noncompliance with General Order requirements. (40 CFR 122.41(l)(2).)

H. Other Noncompliance

The Discharger shall report all instances of noncompliance not reported under Standard Provisions – Reporting V.C, V.D, and V.E above at the time monitoring reports are submitted. The reports shall contain the information listed in Standard Provision – Reporting V.E above. (40 CFR 122.41(l)(7).)

I. Other Information

When the Discharger becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Regional Water Board, State Water Board, or USEPA, the Discharger shall promptly submit such facts or information. (40 CFR 122.41(l)(8).)

VI. STANDARD PROVISIONS – ENFORCEMENT

A. The Regional Water Board is authorized to enforce the terms of this Order under several provisions of the Water Code, including, but not limited to, sections 13385, 13386, and 13387.

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS

A. Publicly-Owned Treatment Works (POTWs)

All POTWs shall provide adequate notice to the Regional Water Board of the following (40 CFR 122.42(b)):

1. Any new introduction of pollutants into the POTW from an indirect discharger that would be subject to sections 301 or 306 of the CWA if it were directly discharging those pollutants (40 CFR 122.42(b)(1)); and

2. Any substantial change in the volume or character of pollutants being introduced into that POTW by a source introducing pollutants into the POTW at the time of adoption of this Order. (40 CFR 122.42(b)(2).)

3. Adequate notice shall include information on the quality and quantity of effluent introduced into the POTW as well as any anticipated impact of the change on the quantity or quality of effluent to be discharged from the POTW. (40 CFR 122.42(b)(3).)

ATTACHMENT E – MONITORING AND REPORTING PROGRAM

Contents

Tables

ATTACHMENT E – MONITORING AND REPORTING PROGRAM (MRP)

National Pollutant Discharge Elimination System (NPDES) regulations at 40 CFR 122.48 require that all NPDES permits specify monitoring and reporting requirements. California Water Code (CWC) sections 13267 and 13383 also authorize the Regional Water Quality Control Board (hereinafter Regional Water Board) to require technical and monitoring reports. This MRP establishes monitoring and reporting requirements that implement the federal and State regulations.

I. GENERAL MONITORING PROVISIONS

A. The Discharger shall comply with this MRP. The Executive Officer may amend this MRP pursuant to 40 CFR 122.62, 122.63, and 124.5. If any discrepancies exist between this MRP and the Regional Standard Provisions (Attachment G), this MRP prevails.

B. The Discharger shall conduct all monitoring in accordance with Attachment D, section III, as supplemented by Attachment G of this Order. Equivalent test methods must be more sensitive than those specified in 40 CFR 136 and must be specified in the permit.

II. MONITORING LOCATIONS

The Discharger shall establish the following monitoring locations to demonstrate compliance with the effluent limitations, discharge specifications, and other requirements in this Order.

Table E-1. Monitoring Station Locations

Type of Sampling Location	Monitoring Location Name	Monitoring Location Description
Influent	INF-001 (formerly M-INF)	At any point in the treatment facility headworks at which all waste tributary to the Plant is present and preceding any phase of treatment. Recycle streams from internal treatment plant processes may be included in the flow for this sampling station.
Effluent	EFF-001 (formerly M-001)	At any point in the outfall between the point of discharge and the point at which all flow tributary to the outfall is present.
Effluent	EFF-002 (formerly M-002)	At any point in the outfall following dechlorination.
Effluent	EFF-002b	At any point in the treatment facility at which all blended fully treated and primary treated waste tributary to the discharge outfall is present (may be the same location as EFF-001 or EFF-002).
Biosolids	BIO-001 (formally B-001)	Sludge in the treatment facility.

III. INFLUENT MONITORING REQUIREMENTS

The Discharger shall monitor influent to the Plant at Monitoring Location INF-001 as follows.

Table E-2. Influent Monitoring

Parameter	Units	Sample Type	Minimum Sampling Frequency
Carbonaceous Biochemical Oxygen Demand 5-day @ 20°C ($CBOD_5$)	mg/L	C-24	1/Week
Total Suspended Solids (TSS)	mg/L	C-24	1/Week

Unit Abbreviations:
mg/L = milligrams per liter
µg/L = micrograms per liter
Sample Type:
C-24 = 24-hour composite
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Week = Once per week

IV. EFFLUENT MONITORING REQUIREMENTS

Except when blending, the Discharger shall monitor discharges of treated wastewater from the Plant at Monitoring Location EFF-001 as follows.

Table E-3. Effluent Monitoring at EFF-001

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	Continuous/D
Enterococcus Bacteria[2]	Colonies/100 mL	Grab	5/Month[3]
Total Coliform Bacteria[2]	MPN/100 mL	Grab	3/Week
Standard Observations[4]	---	---	1/Month

Unit Abbreviations:
MGD = million gallons per day
MPN/100 mL = most probable number per 100 milliliters
Colonies/100 ml = colonies per 100 milliliters
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
3/Week = Three times per week
1/Month = Once per month
5/Month = Five times per month

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Monthly average flow (MGD)
- Maximum daily flow (MGD)
- Minimum daily flow (MGD)

[2] When replicate analyses are made of an enterococcus or total coliform sample, the reported result shall be the geometric mean of the replicate sample.

[3] If after three months the Discharger has demonstrated full compliance with this enterococcus effluent limitation, the minimum monitoring frequency shall be reduced to four times per year. The four samples shall be collected in different calendar months during the higher recreational water contact season (June to October). If the enterococcus effluent limitation is later exceeded, the Discharger

shall conduct 5/Month accelerated sampling for at least three consecutive months. If full compliance is demonstrated after the three-month period, the Discharger may return to the 4/Year sampling frequency.

[4] As described in Attachment G, section III.C.2.

Except when blending, the Discharger shall monitor discharges of treated wastewater from the Plant at Monitoring Location EFF-002 as follows.

Table E-4. Effluent Monitoring at EFF-002

Parameter	Units	Sample Type	Minimum Sampling Frequency
$CBOD_5$	mg/L	C-24	1/Week
TSS	mg/L	C-24	3/Week
CBOD and TSS % Removal[1]	%	Calculate	1/Month
Oil and Grease[2]	mg/L	Grab	1/Quarter
pH[3]	standard units	Grab	1/Day or Continuous/D
Acute Toxicity[4]	% Survival	Flow through	1/Month
Chronic Toxicity[5]	TUc	C-24	1/Quarter
Ammonia	mg/L as N	C-24	1/Month
Copper[6]	µg/L	C-24	1/Month
Cyanide[6]	µg/L	Grab	1/Month
Dioxin-TEQ	µg/L	Grab	2/Year
Total Residual Chlorine[7]	mg/L	Continuous	Continuous/D

Unit Abbreviations:
mg/L = milligrams per liter
TUc = chronic toxicity units
mg/L as N = milligrams per liter as nitrogen
µg/L = micrograms per liter
Sample Type:
C-24 = 24-hour composite
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Week = Once per week
3/Week = Three times per week
1/Day = Once per day
1/Month = Once per month
1/Quarter = Once per quarter
2/Year = Twice per year

[1] The percent removal for CBOD and TSS shall be reported for each calendar month in accordance with Effluent Limitation IV.A.1. Samples for CBOD and TSS shall be collected simultaneously with influent samples.

[2] Each oil and grease sampling and analysis event shall be conducted in accordance with USEPA Method 1664.

[3] If pH is monitored continuously, the minimum and maximum pH values for each day shall be reported in monthly Self-Monitoring Reports (SMRs).

[4] Acute bioassay tests shall be performed in accordance with section V.A of this MRP.

[5] Critical life stage toxicity tests shall be performed and reported in accordance with the Chronic Toxicity Requirements of specified in section V.B of this MRP.

[6] As total recoverable metal.

[7] Effluent chlorine residual concentrations shall be monitored continuously or, at a minimum, every hour. The Discharger shall report for each day the maximum residual chlorine concentration observed following dechlorination. However, if monitoring continuously, the Discharger shall report for each day the maximum residual chlorine concentration based only on discrete readings from the continuous monitoring taken every hour on the hour. The Discharger shall retain continuous monitoring readings for at least three years. The Regional Water Board reserves the right to use all other continuous monitoring data for discretionary enforcement.

During blending events, the Discharger shall monitor discharges of treated wastewater from the Plant at Monitoring Location EFF-001b as follows.

Table E-5. Effluent Monitoring at EFF-001b

Parameter	Units	Sample Type	Minimum Sampling Frequency
Flow[1]	MGD	Continuous	Continuous/D
Volume of partially-treated wastewater	MG	Calculated	1/Blending Event
Duration of Blending Event[2]	hours	Calculated	1/Blending Event
TSS	mg/L	C-24	1/Day
$CBOD_5$	mg/L	Grab or C-24	1/Year[3]
pH[4]	standard units	Grab or C-24	1/Day or Continuous/D
Enterococcus Bacteria	Colonies/100 mL	Grab or C-24	1/Day[3]
Total Coliform Bacteria	MPN/100 mL	Grab or C-24	1/Day[3]
Ammonia	mg/L as N	Grab or C-24	1/Year[3]
Copper [5]	µg/L	Grab or C-24	1/Year[3]
Cyanide[5]	µg/L	Grab or C-24	1/Year[3]
Total Residual Chlorine[6]	mg/L	Continuous	Continuous/D

Unit Abbreviations:
MGD = million gallons per day
MG = million gallons
mg/L = milligrams per liter
mg/L as N = milligrams per liter as nitrogen
MPN/100 mL = most probable number per 100 milliliters
µg/L = micrograms per liter
Sample Type:
C-24 = 24-hour composite
Sampling Frequency:
Continuous/D = measured continuously, and recorded and reported daily
1/Day = Once per day
1/Year = Once per year
1/Blending Event = Once per blending event

[1] For effluent flows, the following information shall be reported monthly:
- Daily average flow (MGD)
- Maximum daily flow (MGD)

[2] For each blending event, report the date and time each event starts and ends.

[3] If a TSS sample collected on the same day exceeds 45 mg/L, the frequency shall be once per day.

[4] If pH is monitored continuously, the minimum and maximum pH values for each day shall be reported in monthly Self-Monitoring Reports (SMRs).

[5] As total recoverable metal.

[6] Daily maximum shall be reported. If a detectable amount of total residual chlorine is reported, the length of time that total residual chlorine was detected shall be reported. Alternatively, the Discharger may evaluate compliance with this requirement by recording discrete readings from the continuous monitoring every hour on the hour, or by collecting grab samples every hour, for a total of 24 samples or readings per day if the following conditions are met: (a) the Discharger shall retain continuous monitoring readings for at least three years; (b) the Discharger shall acknowledge in writing that the Regional Water Board reserves the right to use all other continuous monitoring data for discretionary enforcement; (c) the Discharger must provide in writing the brand names, model numbers, and serial numbers of the equipment used to continuously monitor dechlorinated final effluent chlorine residual.

V. WHOLE EFFLUENT TOXICITY TESTING REQUIREMENTS

The Discharger shall monitor whole effluent acute and chronic toxicity at EFF-002 as follows.

A. Whole Effluent Acute Toxicity

1. **1.** Compliance with the acute toxicity effluent limitations of this Order shall be evaluated by measuring survival of test organisms exposed to 96-hour continuous flow-through bioassays at Monitoring Location EFF-002.

2. **2.** Test organisms shall be rainbow trout (*Oncorhynchus mykiss*) unless the Executive Officer specifies otherwise in writing.

3. **3.** All bioassays shall be performed according to the most up-to-date protocols in 40 CFR 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Water to Freshwater and Marine Organisms,* 5th Edition.

4. **4.** If specific identifiable substances in the discharge can be demonstrated by the Discharger as being rapidly rendered harmless upon discharge to the receiving water, compliance with the acute toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. Written approval from the Executive Officer must be obtained to authorize such an adjustment.

5. **5.** The sample may be taken from final secondary effluent prior to disinfection. Monitoring of the bioassay water shall include, on a daily basis, the following parameters: pH, dissolved oxygen, ammonia (if toxicity is observed), temperature, hardness, and alkalinity. These results shall be reported. If a violation of acute toxicity requirements occurs, the bioassay test shall be repeated with new fish as soon as practical and shall be repeated until a test fish survival rate of 90 percent or greater is observed. If the control fish survival rate is less than 90 percent, the bioassay test shall be restarted with new fish and shall continue as soon as practical until an acceptable test is completed (i.e., control fish survival rate is 90 percent or greater).

B. Whole Effluent Chronic Toxicity

1. Chronic Toxicity Monitoring Requirements

a. Sampling. The Discharger shall collect 24-hour composite samples of the effluent for critical life stage toxicity testing as indicated below. For toxicity tests requiring renewals, 24-hour composite samples collected on consecutive days are required.

b. Test Species. The test species shall be *Americamysis bahia* (mysid shrimp). The Discharger shall conduct a screening chronic toxicity test as described in Appendix E-1 following any significant change in the nature of the effluent or prior to application for permit renewal. The most sensitive species shall be used thereafter for routine chronic toxicity monitoring. The Executive Officer may authorize a change to another test species if the Discharger's chronic toxicity screening data suggest that another test species is more sensitive to the discharge.

c. Frequency. The frequency of routine and accelerated chronic toxicity monitoring shall be as specified below:

(1) Undertake routine monitoring *quarterly*.

(2) Accelerate monitoring to *monthly* after exceeding a three-sample median of 10 TU_c[1] or a single sample maximum of 20 TU_c. The Executive Officer may specify a different frequency for accelerated monitoring based on the TU_c results.

(3) Return to routine monitoring if accelerated monitoring does not exceed either trigger in (2), above.

(4) If accelerated monitoring confirms consistent toxicity in excess of either trigger in (2), above, continue accelerated monitoring and initiate toxicity reduction evaluation (TRE) procedures in accordance with section V.B.3, below.

(5) Return to routine monitoring after implementing appropriate elements of the TRE, and either the toxicity drops below both triggers in (2), above, or, based on the TRE results, the Executive Officer authorizes a return to routine monitoring.

Monitoring conducted pursuant to a TRE shall satisfy the requirements for routine and accelerated monitoring while the TRE investigation is underway.

d. **Methodology.** Sample collection, handling, and preservation shall be in accordance with USEPA protocols. In addition, bioassays shall be conducted in compliance with the most recently promulgated test methods, as shown in Appendix E-1. These are *Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Marine and Estuarine Organisms,* currently fourth Edition (EPA-821-R-02-013), with exceptions granted the Discharger in writing by the Executive Officer and the Environmental Laboratory Accreditation Program (ELAP). If specific identifiable substances in the discharge can be demonstrated by the Discharger as being rapidly rendered harmless upon discharge to the receiving water, compliance with the chronic toxicity limit may be determined after the test samples are adjusted to remove the influence of those substances. Written approval from the Executive Officer must be obtained to authorize such an adjustment.

e. **Dilution Series.** The Discharger shall conduct tests at 40%, 20%, 10%, 5%, and 2.5%. The “%” represents percent effluent as discharged. The Discharger may use the biological buffer MOPS (3-(N-morpholino)propanesulfonic acid) to control pH drift and ammonia toxicity caused by increasing pH during the test.

2. **Chronic Toxicity Reporting Requirements**

a. **Routine Reporting.** Toxicity test results for the current reporting period shall include, at a minimum, for each test:

(1) Sample date

(2) Test initiation date

(3) Test species

[1] A TU_c equals 100 divided by the no observable effect level (NOEL). The NOEL is determined from IC_{25}, EC_{25}, or NOEC values. These terms, their usage, and other chronic toxicity monitoring program requirements are defined in the MRP (Attachment E).

(4) End point values for each dilution (e.g., number of young, growth rate, percent survival)

(5) No Observable Effect Level (NOEL) values in percent effluent. The NOEL shall equal to the IC_{25} or EC_{25} (see Appendix E-1). If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall equal to the No Observable Effect Concentration (NOEC) derived using hypothesis testing. The NOEC is the maximum percent effluent concentration that causes no observable effect on test organisms based on a critical life stage toxicity test.

(6) IC_{15}, IC_{25}, IC_{40}, and IC_{50} values (or EC_{15}, EC_{25} ... etc.) as percent effluent

(7) TU_c values (100/NOEL, where NOEL = IC_{25}, EC_{25}, or NOEC as discussed in Appendix E-1

(8) Mean percent mortality (±s.d.) after 96 hours in 100% effluent (if applicable)

(9) IC_{50} or EC_{50} values for reference toxicant tests

(10) Available water quality measurements for each test (pH, dissolved oxygen, temperature, conductivity, hardness, salinity, ammonia)

b. Compliance Summary. The results of the chronic toxicity testing shall be provided in the self-monitoring report as TUc's.

3. Chronic Toxicity Reduction Evaluation (TRE)

a. The Discharger shall prepare a generic TRE work plan within 90 days of the effective date of this Order to be ready to respond to toxicity events. The Discharger shall review and update the work plan as necessary so that it remains current and applicable to the discharge and discharge facilities.

b. Within 30 days of exceeding either chronic toxicity trigger, the Discharger shall submit to the Regional Water Board a TRE work plan, which shall be the generic work plan revised as appropriate for this toxicity event after consideration of available discharge data.

c. Within 30 days of the date of completion of the accelerated monitoring tests observed to exceed either trigger, the Discharger shall initiate a TRE in accordance with a TRE work plan that incorporates any and all comments from the Executive Officer.

d. The TRE shall be specific to the discharge and be in accordance with current technical guidance and reference materials, including USEPA guidance materials. The TRE shall be conducted as a tiered evaluation process, such as summarized below:

(1) Tier 1 consists of basic data collection (routine and accelerated monitoring).

(2) Tier 2 consists of evaluation of optimization of the treatment process, including operation practices and in-plant process chemicals.

(3) Tier 3 consists of a toxicity identification evaluation (TIE).

(4) Tier 4 consists of evaluation of options for additional effluent treatment processes.

(5) Tier 5 consists of evaluation of options for modifications of in-plant treatment processes.

(6) Tier 6 consists of implementation of selected toxicity control measures, and follow-up monitoring and confirmation of implementation success.

e. The TRE may be ended at any stage if monitoring finds there is no longer consistent toxicity (complying with requirements of Provision IV.C.2 of the Order).

f. The objective of the TIE shall be to identify the substance or combination of substances causing the observed toxicity. All reasonable efforts using currently available TIE methodologies shall be employed.

g. As toxic substances are identified or characterized, the Discharger shall continue the TRE by determining the sources and evaluating alternative strategies for reducing or eliminating the substances from the discharge. All reasonable steps shall be taken to reduce toxicity to levels consistent with chronic toxicity evaluation parameters.

h. Many recommended TRE elements parallel required or recommended efforts of source control, pollution prevention, and storm water control programs. TRE efforts should be coordinated with such efforts. To prevent duplication of efforts, evidence of complying with requirements or recommended efforts of such programs may be acceptable to comply with TRE requirements.

i. The Regional Water Board recognizes that chronic toxicity may be episodic and identification of causes of and reduction of sources of chronic toxicity may not be successful in all cases. Consideration of enforcement action by the Regional Water Board will be based in part on the Discharger's actions and efforts to identify and control or reduce sources of consistent toxicity.

VI. RECEIVING WATER MONITORING REQUIREMENTS

The Discharger shall continue to participate in the San Francisco Estuary Institute's Regional Monitoring Program (RMP).

VII. PRETREATMENT AND BIOSOLIDS MONITORING REQUIREMENTS

The Discharger shall comply with the pretreatment requirements specified below for influent (at Monitoring Location INF-001), effluent (at Monitoring Location EFF-002), and biosolids monitoring (at Monitoring Location BIO-001). The Discharger shall report summaries of analytical results in annual and semi-annual pretreatment reports in accordance with Attachment H. At its option, the Discharger may also report biosolids analytical results in its eSMR by manual entry, by EDF/CDF, or as an attached file.

Table E-6. Pretreatment and Biosolids Monitoring Requirements

Constituents	Influent	Effluent[1]	Biosolids	Sample Type	
				INF-001 & EFF-002	Biosolids
VOC[2]	2/year	2/year	2/year	grabs	grab[6c]
BNA[3]	1/year	1/year	2/year	grabs	grab[6c]
Metals[4]	1/month	1/month	2/year	24-hour composite[6a]	grab[6c]
Hexavalent Chromium[5]	1/month	1/month	2/year	grab	grab[6c]
Mercury	1/month	1/month	2/year	grab or 24-hour composite[6a,6b]	grab[6c]
Cyanide	1/month	1/month	2/year	grab	grab[6c]

Footnotes for Table E-6:
(1) The Discharger may elect to use the effluent monitoring conducted in accordance with Table E-4 to satisfy these pretreatment monitoring requirements.
(2) VOC: volatile organic compounds
(3) BNA: base/neutrals and acids extractable organic compounds
(4) The metals are arsenic, cadmium, copper, lead, nickel, silver, zinc, and selenium.
(5) The Discharger may elect to report total chromium instead of hexavalent chromium. Samples collected for total chromium measurements shall be 24-hour composites.
(6) Sample types:

a. If an automatic compositor is used, the Discharger shall obtain 24-hour composite samples through flow-proportioned composite sampling. Alternatively, 24-hour composite samples may consist of discrete grab samples combined (volumetrically flow-weighted) prior to analysis or mathematically flow-weighted.
b. The Discharger may use automatic compositors for mercury if either (1) the compositing equipment (hoses and containers) comply with ultraclean specifications, or (2) appropriate equipment blank samples demonstrate that the compositing equipment has not contaminated the sample.
c. The biosolids sample shall be a composite of the biosolids to be disposed. Biosolids collection and monitoring shall comply with the requirements specified in Attachment H, Appendix H-4. The Discharger shall also comply with the biosolids monitoring requirements of 40 CFR 503.

VIII. REPORTING REQUIREMENTS

A. General Monitoring and Reporting Requirements

The Discharger shall comply with all Federal Standard Provisions (Attachment D) and Regional Standard Provisions (Attachment G) related to monitoring, reporting, and recordkeeping, with modifications shown in section VIII.D below.

B. Self Monitoring Reports (SMRs)

1. **SMR Format.** The Discharger shall electronically submit SMRs using the State Water Board's California Integrated Water Quality System (CIWQS) Program Web site (http://www.waterboards.ca.gov/ciwqs/index.html). The CIWQS website will provide additional directions for SMR submittals in the event of a service interruption for electronic submittal.

2. **SMR Due Dates and Contents.** The Discharger shall submit SMRs by the due dates, and with the contents, specified below:

   a. **Monthly SMRs —** Monthly SMRs shall be due 30 days after the end of each calendar month, covering that calendar month. The monthly SMR shall contain the applicable items described in sections V.B and V.C of both Attachments D and G of this Order. See Provision VI.C.2.a (Effluent Characterization Study and Report) of this Order for information that must also be reported with the monthly SMR.

b. **Annual SMR** — Annual SMRs shall be due February 1 each year, covering the previous calendar year. The annual SMR shall contain the items described in sections V.C.1.f(2), V.C.1.f(6) as applicable, and V.C.1.f(7) of the Regional Standard Provisions (Attachment G). Information described in the other subsections of V.C.1.f of Attachment G is not required. See also Provision VI.C.2.a of the Order (Effluent Characterization Study and Report) for requirements to submit reports with the annual SMR.

c. **Additional Specifications for Submitting SMRs to CIWQS —** The Discharger shall submit analytical results and other information using one of the following methods:

Table E-7. SMR Reporting for CIWQS

Parameter	Method of Reporting	
	EDF/CDF data upload or manual entry	**Attached File**
All parameters identified in influent, effluent, and receiving water monitoring tables (except Dissolved Oxygen and Temperature)	Required for All Results	
Dissolved Oxygen Temperature	Required for Monthly Maximum and Minimum Results Only [1]	Discharger may use this method for all results or keep records
Cyanide Arsenic Cadmium Chromium Copper Lead Mercury Nickel Selenium Silver Zinc Dioxins and Furans (by U.S. EPA Method 1613)	Required for All Results [2]	
Antimony Beryllium Thallium Pollutants by U.S. EPA Methods 601, 602, 608, 610, 614, 624, and 625	Not Required (unless identified in influent, effluent, or receiving water monitoring tables), But Encouraged [1]	Discharger may use this method and submit results with application for permit reissuance, unless data submitted by CDF/EDF upload
Analytical Method	Not Required (Discharger may select "data unavailable") [1]	
Collection Time Analysis Time	Not Required (Discharger may select "0:00") [1]	

[1] The Discharger shall continue to monitor at the minimum frequency specified in the monitoring tables, keep records of the measurements, and make the records available upon request.

[2] These parameters require EDF/CDF data upload or manual entry regardless of whether monitoring is required by this MRP or other provisions of this Order (except for biosolids, sludge, or ash provisions).

3. **Monitoring Periods.** Monitoring periods for all required monitoring shall be completed as set forth in the table below:

Table E-8. Monitoring Periods and Reporting Schedule

Sampling Frequency	Monitoring Period Begins On…	Monitoring Period
Continuous	Permit effective date	All
1/Day	Permit effective date	(Midnight through 11:59 PM) or any 24-hour period that reasonably represents a calendar day for purposes of sampling.
2/Week 4/Week 5/Week	Permit effective date	Sunday through Saturday
1/Month	Permit effective date	First day of calendar month through last day of calendar month
1/2 Months	Permit effective date	First day of calendar month through last day of next calendar month
1/Year	Permit effective date	January 1through December 31
2/Year	Permit effective date	Once during the wet season (typically November 1 – April 30) and once during the dry season (typically May 1 through October 31)
1/5 Years	Permit effective date	Once during the permit term within 12 months prior to applying for permit reissuance.

4. **RL and MDL Reporting.** The Discharger shall report with each sample result the Reporting Level (RL) and Method Detection Limit (MDL) as determined by the procedure in 40 CFR 136. The Discharger shall report the results of analytical determinations for the presence of chemical constituents in a sample using the following reporting protocols:

   a. Sample results greater than or equal to the RL shall be reported as measured by the laboratory (i.e., the measured chemical concentration in the sample).

   b. Sample results less than the RL, but greater than or equal to the laboratory's MDL, shall be reported as "Detected, but Not Quantified," or DNQ. The estimated chemical concentration of the sample shall also be reported. For purposes of data collection, the laboratory shall write the estimated chemical concentration next to DNQ. The laboratory may, if such information is available, include numerical estimates of the data quality for the reported result. Numerical estimates of data quality may be percent accuracy (+/- a percentage of the reported value), numerical ranges (low to high), or any other means the laboratory considers appropriate.

   c. Sample results less than the laboratory's MDL shall be reported as "Not Detected" or ND.

   d. The Discharger shall instruct laboratories to establish calibration standards so that the minimum level (ML) value (or its equivalent if there is differential treatment of samples relative to calibration standards) is the lowest calibration standard. At no time is the Discharger to use analytical data derived from extrapolation beyond the lowest point of the calibration curve.

C. Discharge Monitoring Reports

1. As described in section VIII.B.1 above, at any time during the term of this permit, the State or Regional Water Board may notify the Discharger to electronically submit SMRs that will satisfy federal requirements for submittal of Discharge Monitoring Reports (DMRs). Until such notification is given, the Discharger shall submit DMRs in accordance with the requirements described below.

2. Once notified by the State or Regional Water Board, the Discharger shall submit hard copy DMRs. DMRs must be signed and certified as required by the Standard Provisions (Attachment D). The Discharger shall submit the original DMR and one copy of the DMR to one of the addresses listed below:

Standard Mail	FedEx/UPS/Other Private Carriers
State Water Resources Control Board Division of Water Quality c/o DMR Processing Center PO Box 100 Sacramento, CA 95812-1000	State Water Resources Control Board Division of Water Quality c/o DMR Processing Center 1001 I Street, 15th Floor Sacramento, CA 95814

3. All discharge monitoring results must be reported on the official USEPA pre-printed DMR forms (EPA Form 3320-1). Forms that are self-generated will not be accepted unless they follow the exact same format of EPA Form 3320-1.

D. Modifications to Attachment G

1. **Attachment G sections V.C.1.f and V.C.1.g are revised as follows, and section V.C.1.h (Reporting data in electronic format) is deleted.**

   f. Annual self monitoring report requirements

   By the date specified in the MRP, the Discharger shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

   1) Annual compliance summary table of treatment plant performance, including documentation of any blending events (this summary table is not required if the Discharger has submitted the year’s monitoring results to CIWQS in electronic reporting format by EDF/CDF upload or manual entry);

   2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Discharger’s wastewater collection, treatment, or disposal practices.);

3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater (this item is not required if the Discharger has submitted the year's monitoring results to CIWQS in electronic reporting format by EDF/CDF upload or manual entry);

4) List of approved analyses, including the following:

    (i) List of analyses for which the Discharger is certified;

    (ii) List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

    (iii) List of "waived" analyses, as approved;

5) Plan view drawing or map showing the Discharger's facility, flow routing, and sampling and observation station locations;

6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Discharger does not route all storm water to the headworks of its wastewater treatment plant); and

7) Results of facility report reviews (The Discharger shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Discharger shall submit SMRs addressed as follows, unless the Discharger submits SMRs electronically to CIWQS:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format – *Deleted*

2. Attachment G sections V.E.2, V.E.2.a, and V.E.2.c are revised as follows, and sections V.E.2.b (24-hour Certification) and V.E.2.d (Communication Protocol) are deleted.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[2]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and supersede requirements imposed on the Discharger by the Executive Officer by letter of May 1, 2008.

a. Two (2)-Hour Notification

For any unauthorized discharges that enter a drainage channel or a surface water, the Discharger shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the California Emergency Management Agency (CalEMA, currently 800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. Timely notification by the Discharger to CalEMA also satisfies notification to the Regional Water Board. Notification shall include the following:

1) Incident description and cause;

2) Location of threatened or involved waterway(s) or storm drains;

3) Date and time the unauthorized discharge started;

4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification – *Deleted*

c. 5-day Written Report

Within five business days, the Discharger shall submit a written report that includes, in addition to the information required above, the following:

1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

[2] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

2) Efforts implemented to minimize public exposure to the unauthorized discharge;

3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

4) Corrective measures taken to minimize the impact of the unauthorized discharge;

5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol – *Deleted*

APPENDIX E-1
CHRONIC TOXICITY
DEFINITION OF TERMS AND SCREENING PHASE REQUIREMENTS

I. Definition of Terms

A. No observed effect level (NOEL) for compliance determination is equal to IC_{25} or EC_{25}. If the IC_{25} or EC_{25} cannot be statistically determined, the NOEL shall be equal to the NOEC derived using hypothesis testing.

B. Effective concentration (EC) is a point estimate of the toxicant concentration that would cause an adverse effect on a quantal, “all or nothing,” response (such as death, immobilization, or serious incapacitation) in a given percent of the test organisms. If the effect is death or immobility, the term lethal concentration (LC) may be used. EC values may be calculated using point estimation techniques such as probit, logit, and Spearman-Karber. EC_{25} is the concentration of toxicant (in percent effluent) that causes a response in 25 percent of the test organisms.

C. Inhibition concentration (IC) is a point estimate of the toxicant concentration that would cause a given percent reduction in a nonlethal, nonquantal biological measurement, such as growth. For example, an IC_{25} is the estimated concentration of toxicant that would cause a 25 percent reduction in average young per female or growth. IC values may be calculated using a linear interpolation method such as USEPA's Bootstrap Procedure.

D. No observed effect concentration (NOEC) is the highest tested concentration of an effluent or a toxicant at which no adverse effects are observed on the aquatic test organisms at a specific time of observation. It is determined using hypothesis testing.

II. Chronic Toxicity Screening Phase Requirements

A. The Discharger shall perform screening phase monitoring:

1. Subsequent to any significant change in the nature of the effluent discharged through changes in sources or treatment, except those changes resulting from reductions in pollutant concentrations attributable to source control efforts, or

2. Prior to permit reissuance. Screening phase monitoring data shall be included in the NPDES permit application for reissuance. The information shall be as recent as possible, but may be based on screening phase monitoring conducted within 5 years before the permit expiration date.

B. Design of the screening phase shall, at a minimum, consist of the following elements:

1. Use of test species specified in Appendix E-2, attached, and use of the protocols referenced in those tables, or as approved by the Executive Officer.

2. Two stages:

a. Stage 1 shall consist of a minimum of one battery of tests conducted concurrently. Selection of the type of test species and minimum number of tests shall be based on Appendix E-2 (attached).
b. Stage 2 shall consist of a minimum of two test batteries conducted at a monthly frequency using the three most sensitive species based on the Stage 1 test results and as approved by the Executive Officer.

3. Appropriate controls.

4. Concurrent reference toxicant tests.

5. Dilution series of 100%, 50%, 25%, 12.5%, 6.25%, and 0 %, where "%" is percent effluent as discharged, or as otherwise approved the Executive Officer.

C. The Discharger shall submit a screening phase proposal acceptable to the Executive Officer. The proposal shall address each of the elements listed above. If within 30 days, the Executive Officer does not comment, the Discharger shall commence with screening phase monitoring.

APPENDIX E-2
SUMMARY OF TOXICITY TEST SPECIES REQUIREMENTS

Table AE-1. Critical Life Stage Toxicity Tests for Estuarine Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Alga	*(Skeletonema costatum)* *(Thalassiosira pseudonana)*	Growth rate	4 days	1
Red alga	*(Champia parvula)*	Number of cystocarps	7–9 days	3
Giant kelp	*(Macrocystis pyrifera)*	Percent germination; germ tube length	48 hours	2
Abalone	*(Haliotis rufescens)*	Abnormal shell development	48 hours	2
Oyster Mussel	*(Crassostrea gigas)* *(Mytilus edulis)*	Abnormal shell development; percent survival	48 hours	2
Echinoderms - Urchins Sand dollar	*(Strongylocentrotus purpuratus, S. franciscanus)* *(Dendraster excentricus)*	Percent fertilization	1 hour	2
Shrimp	*(Americamysis bahia)*	Percent survival; growth	7 days	3
Shrimp	*(Holmesimysis costata)*	Percent survival; growth	7 days	2
Topsmelt	*(Atherinops affinis)*	Percent survival; growth	7 days	2
Silversides	*(Menidia beryllina)*	Larval growth rate; percent survival	7 days	3

Toxicity Test References:

1. American Society for Testing Materials (ASTM). 1990. Standard Guide for Conducting Static 96-Hour Toxicity Tests with Microalgae. Procedure E 1218-90. ASTM, Philadelphia, PA.

2. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to West Coast Marine and Estuarine Organisms. EPA/600/R-95/136. August 1995.

3. Short-term Methods for Estimating the Chronic Toxicity of Effluent and Receiving Waters to Marine and Estuarine Organisms. EPA/600/4-90/003. July 1994.

Table AE-2. Critical Life Stage Toxicity Tests for Fresh Waters

Species	(Scientific Name)	Effect	Test Duration	Reference
Fathead minnow	*(Pimephales promelas)*	Survival; growth rate	7 days	4
Water flea	*(Ceriodaphnia dubia)*	Survival; number of young	7 days	4
Alga	*(Selenastrum capricornutum)*	Final cell density	4 days	4

Toxicity Test Reference:

4. Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, fourth Edition Chronic manual (EPA-821-R-02-013, October 2002).

Table AE-3. Toxicity Test Requirements for Stage One Screening Phase

Requirements	Receiving Water Characteristics		
	Discharges to Coast	Discharges to San Francisco Bay[1]	
	Ocean	Marine/Estuarine	Freshwater
Taxonomic diversity	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish	1 plant 1 invertebrate 1 fish
Number of tests of each salinity type: Freshwater[2] Marine/Estuarine	0 4	1 or 2 3 or 4	3 0
Total number of tests	4	5	3

[1] (a) Marine refers to receiving water salinities greater than 1 part per thousand (ppt) at least 95 percent of the time during a normal water year.
(b) Freshwater refers to receiving water with salinities less than 1 ppt at least 95 percent of the time during a normal water year.
(c) Estuarine refers to receiving water salinities that fall between those of marine and freshwater, as described above.

[2] The freshwater species may be substituted with marine species if:
(a) The salinity of the effluent is above 1 ppt greater than 95 percent of the time, or
(b) The ionic strength (TDS or conductivity) of the effluent at the test concentration used to determine compliance is documented to be toxic to the test species.

ATTACHMENT F - FACT SHEET

Contents

Tables

ATTACHMENT F – FACT SHEET

As described in section II of this Order, this Fact Sheet includes the legal requirements and technical rationale that serve as the basis for the requirements of this Order.

This Order has been prepared under a standardized format to accommodate a broad range of discharge requirements for dischargers in California. Only those sections or subsections of this Order that are specifically identified as "not applicable" have been determined not to apply to this Discharger. Sections or subsections of this Order not specifically identified as "not applicable" fully apply to this Discharger.

I. PERMIT INFORMATION

The following table summarizes administrative information related to the Central Marin Sanitation Agency Wastewater Treatment Plant (Plant).

Table F-1. Facility Information

WDID	2 215116001
CIWQS Place ID	213889
Discharger	Central Marin Sanitation Agency
Name of Facility	Central Marin Sanitation Agency Wastewater Treatment Plant and its force mains
Facility Address	1301 Anderson Drive, San Rafael, CA 94901
	Marin County
Facility Contact, Title, Phone	Robert N. Cole, Environmental Services Manager, (415) 459-1455
Authorized Person to Sign and Submit Reports	Same as above
Mailing Address	1301 Anderson Drive, San Rafael, CA 94901
Billing Address	Same as Mailing Address
Type of Facility	Publicly Owned Treatment Works (POTW)
Major or Minor Facility	Major
Threat to Water Quality	2
Complexity	A
Pretreatment Program	Yes
Reclamation Requirements	Not Applicable
Facility Permitted Flow	10.0 million gallons per day (MGD) (average daily dry weather flow)
Facility Design Flow	10 MGD (average daily dry weather flow) 30 MGD (secondary treatment capacity)
Watershed	San Francisco Bay
Receiving Water	Central San Francisco Bay
Receiving Water Type	Estuarine
Service Area	San Rafael, Kentfield, Greenbrae, Ross, Corte Madera, Larkspur, San Anselmo, Fairfax, and San Quentin Prison
Service Area Population	129,000

A. Central Marin Sanitation Agency (hereinafter Discharger) is the owner and operator of the Plant, a Publicly Owned Treatment Works, and its associated force mains (hereinafter, collectively, Facility). The Plant provides secondary treatment of wastewater collected from its service area and discharges it to Central San Francisco Bay.

For the purposes of this Order, references to the "discharger" or "permittee" in applicable federal and state laws, regulations, plans, or policy are held to be equivalent to references to the Discharger herein.

B. Discharge of treated wastewater from the Plant to Central San Francisco Bay, a water of the State and the United States, is currently regulated by Order No. R2-2007-0007 (NPDES Permit No. CA0038628), which was adopted on January 23, 2007, became effective on April 1, 2007, and expires on March 31, 2012. The discharge is also regulated under Regional Water Board Order No. R2-2007-0077 (NPDES Permit No. CA0038849), as amended by Order No. R2-2011-0012, which superseded all requirements on mercury and polychlorinated biphenyls (PCBs) from wastewater discharges. This Order does not affect the mercury and PCBs permit.

C. The Discharger filed a Report of Waste Discharge (ROWD) and submitted a complete application for renewal of its waste discharge requirements (WDRs) and NPDES permit dated October 3, 2011.

II. FACILITY DESCRIPTION

A. Description of Wastewater and Biosolids Treatment

1. **Facility Description.** The Discharger was formed under a Joint Exercise of Powers Agreement in 1979 by the San Rafael Sanitation District, Sanitary District No. 1 of Marin County (also known as Ross Valley Sanitary District), Sanitary District No. 2 of Marin County (a subsidiary of the Town of Corte Madera), and the City of Larkspur. The Discharger owns and operates the Plant and a portion of its associated wastewater collection system. The Plant, located within the City of San Rafael, provides secondary treatment of domestic, commercial, and industrial wastewater for its four member agencies and the California Department of Corrections (San Quentin Prison). The population of the service area is approximately 129,000. Attachment B provides a map of the area around the Plant. From April 2007 through March 2010, the average dry weather flow rate was 6.2 MGD and the average wet weather flow rate was 12.3 MGD. Two significant industrial users discharge to the Facility and are regulated through the Discharger's pretreatment program.

2. **Collection System.** The Discharger owns and operates approximately 3,800 feet of force mains immediately upstream of the Plant (location shown in Attachment B). The Discharger does not own or operate any of the sewer systems that feed into the Discharger's force mains. These are owned and operated by separate agencies. Sanitary District No. 1 of Marin County owns and operates about 200 miles of sewer lines serving Larkspur and nearby unincorporated areas (Kentfield, Greenbrae, Fairfax, Ross, San Anselmo). Sanitary District No. 2 of Marin County owns and operates about 45 miles of sewer lines serving the Town of Corte Madera. San Rafael Sanitary District owns and operates about 150 miles of sewer lines serving the City of San Rafael. The California Department of Corrections owns and operates a sewer collection system serving the San Quentin Prison. The prison is about one mile from the Plant. The County of Marin also owns and operates a sewer collection system serving San Quentin Village that discharges into the lines owned by the prison. The Discharger operates and maintains pump stations under contract for Sanitary District No. 2 of Marin County. All of the above described collection systems, except for the portions owned by the California Department of Corrections and the County of Marin, and the Discharger's force mains, are covered by the statewide General Waste Discharge Requirements for Sanitary Sewer Systems (Order No. 2006-0003-DWQ).

3. **Treatment Description.** Treatment processes consist of screening, grit removal, primary sedimentation, secondary biological treatment, secondary clarification, chlorination, and dechlorination. During periods of wet weather, primary treated effluent flows greater than 30 MGD are routed around secondary treatment and blended with secondary treated effluent prior to disinfection. The Discharger's outfall pipeline between the Plant and San Francisco Bay is located partially below the tideline elevation. This impedes the Discharger's ability to discharge effluent during wet weather and high tide conditions requiring the use of an effluent pumping station built in 2010. The Plant uses an onsite storage basin to store up to 7 million gallons of effluent during wet weather diversions of the secondary treatment units. When flows subside, the stored wastewater is either sent to the chlorine disinfection units for discharge or routed back to the headworks for re-treatment (for example, if for some reason it does not meet discharge limitations). These steps are shown in the process flow diagram in Attachment C.

4. **Discharge Point.** Secondarily-treated wastewater is discharged at Discharge Point No. 001 to Central San Francisco Bay via a submerged outfall equipped with a multi-port diffuser. The diffuser is approximately 8,000 feet offshore at a depth of about 12 to 28 feet at mean lower low water. It is oriented about 145 degrees clockwise from north and has 176 ports fitted with duckbill diffuser valves to induce turbulent mixing. The valves reduce the effective open area of the ports as flow is reduced.

5. **Biosolids Management.** Solids from the primary clarifiers and secondary clarifiers are processed via dissolved air flotation, anaerobic digestion, polymer and ferric chloride conditioning, and dewatering using high speed centrifuges. Processed solids are hauled offsite. They are land applied at Synagro West's Lakeville Ranch sites in Sonoma County, reused at Redwood Landfill and Recycling Center in Marin County as alternate daily cover, or composted.

6. **Stormwater Discharge.** The Discharger is covered under the State Water Board's statewide industrial stormwater NPDES permit (NPDES General Permit No. CAS000001) for all parts of the Plant that do not drain back to the headworks. All stormwater flows in contact with equipment or wastewater at the Plant and the pump stations serving the Plant are collected and directed to the headworks for treatment.

7. **Water Recycling.** The Discharger provides reclaimed water to Remillard Park Pond to provide habitat for an endangered species of turtle. The water is provided during the dry weather season when requested by the City of Larkspur due to low water in the pond, endangering the survival of the pond's wildlife.

B. Discharge Point and Receiving Waters

The location of the discharge point and the receiving waters are indicated below.

Table F-2. Outfall Locations

Discharge Point	Effluent Description	Discharge Point Latitude	Discharge Point Longitude	Receiving Water
001	Secondary Treated Municipal Wastewater	37º 56′ 54″ N	122º 27′ 23″ W	Central San Francisco Bay

Central San Francisco Bay is located within the San Francisco Bay watershed. Central San Francisco Bay is a tidally-influenced, estuarine waterbody. The discharge to Central San Francisco Bay is a deep water discharge and receives a minimum initial dilution of 43:1.

C. Summary of Existing Requirements and Self-Monitoring Report Data

Effluent limitations applicable to Discharge Point No. 001 contained in the previous permit (Order No. R2-2007-0007) and representative monitoring data from the term of the previous permit are presented below.

Table F-3. Historic Effluent Limitations and Monitoring Data for Conventional and Non-Conventional Pollutants and Toxic Pollutants

Parameter	Units	Effluent Limitations			Monitoring Data (From 04/07- 04/11)	
		Monthly Average	Weekly Average	Daily Maximum	Average[1]	Range
5-day Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	mg/L	25	40	---	<6.1	2.0-43
Total Suspended Solids (TSS)	mg/L	30	45	---	6.4	0.5-65
Oil and Grease	mg/L	10	---	20	<2.3	1.2-2.7
Total Coliform Bacteria	Colonies/100 mL	240	---	10,000	<70	2.0-5,000
Copper	µg/L	13	22		4.4	2.0-12
Cyanide	µg/L	21	41		<2.7	0.6-4.9
Dioxin-TEQ	µg/L	1.4×10^{-8}	2.8×10^{-8}		1.5×10^{-9}	7.8×10^{-12}-6.3×10^{-9}

Unit Abbreviations:

mg/L = milligrams per liter
s.u. = standard units
mL = milliliters
µg/L= micrograms per liter

[1] Some of the values used to calculate the average were below the minimum detection level. In those cases, the minimum detection level was used to calculate an average likely higher than the "true" average, as denoted by "<.".

D. Compliance Summary

The Discharger has not exceeded any effluent limitation during the previous permit term and has completed all special activities required by the previous permit provisions.

E. Planned Changes

The Discharger is currently undertaking digester improvements, including the construction of a new fats, oils, and grease (FOG) and food waste receiving station. Waste haulers will collect post-consumer food waste from local restaurants and markets and deliver it to the Plant; bacteria in the anaerobic digesters will break down the food waste and release methane as a renewable energy byproduct. The digester improvements are expected to be completed by the end of calendar year 2013.

F. Blending Summary

When influent flows are above 30 MGD, the Discharger may bypass secondary treatment for the portion of the flow above 30 MGD and recombine the bypassed flows with the secondarily-treated flow, disinfected, and discharged to San Francisco Bay. This process is also known as blending. The Discharger blends approximately 24 times per year. The table below summarizes blending from 2006 through 2010. The Discharger anticipates that the recent Plant upgrades will reduce the average annual number of blending days from 33 to about 11, and the average annual blending volume by 55% over pre-improvement conditions.

Table F-4. Historical Blending Summary

Calendar Year	Number of Blending Days	Annual Volume of Primary Portion of Blended Effluent (MG)	Annual Precipitation (inches)
2006	49	159	31
2007	10	23	15
2008	17	118	22
2009	12	112	23
2010	30	196	46
Average	**24**	**122**	**27**

III. APPLICABLE PLANS, POLICIES, AND REGULATIONS

This Order's requirements are based on the requirements and authorities described in this section.

A. Legal Authorities

This Order is issued pursuant to federal Clean Water Act (CWA) section 402 and implementing regulations adopted by the USEPA and California Water Code (CWC) chapter 5.5, division 7, commencing with section 13370. It serves as an NPDES permit for point source discharges from the Facility to surface waters. This Order also serves as Waste Discharge Requirements (WDRs) pursuant to CWC article 4, chapter 4, division 7, commencing with section 13260.

B. California Environmental Quality Act (CEQA)

Under CWC section 13389, this action to issue an NPDES permit is exempt from Chapter 3 of CEQA.

C. State and Federal Regulations, Policies, and Plans

1. **Water Quality Control Plan.** *The Water Quality Control Plan for the San Francisco Bay Basin* (hereinafter Basin Plan) is the Regional Water Board's master water quality control planning document. It designates beneficial uses and water quality objectives (WQOs) for waters of the State, including surface and groundwater. It also includes implementation programs to achieve WQOs. The Basin Plan was duly adopted by the Regional Water Board and approved by the State Water Board, the Office of Administrative Law, and USEPA. Requirements of this Order implement the Basin Plan.

   The Basin Plan beneficial uses of Central San Francisco Bay are listed below. The Basin Plan implements State Water Board Resolution No. 88-63, which establishes State policy that all waters, with certain exceptions, should be considered suitable or potentially suitable for municipal or domestic supply. Because of the marine influence on Central San Francisco Bay, total dissolved solid levels exceed 3,000 mg/L and thereby meet an exception to State Water Board Resolution No. 88-63. The MUN designation therefore does not apply to the receiving water.

Table F-5. Basin Plan Beneficial Uses

Receiving Water Name	Beneficial Uses
Central San Francisco Bay	Industrial Service Supply (IND) Industrial Process Supply (PROC) Commercial, and Sport Fishing (COMM) Shellfish Harvesting (SHELL) Estuarine Habitat (EST) Fish Migration (MIGR) Preservation of Rare and Endangered Species (RARE) Fish Spawning (SPWN) Wildlife Habitat (WILD) Water Contact Recreation (REC1) Non-Contact Water Recreation (REC2) Navigation (NAV)

The State Water Board's *Water Quality Control Plan for Enclosed Bays and Estuaries—Part 1, Sediment Quality* became effective on August 25, 2009. This plan supersedes other narrative sediment quality objectives and establishes new sediment quality objectives and related implementation provisions for specifically defined sediments in most bays and estuaries.

2. **National Toxics Rule (NTR) and California Toxics Rule (CTR).** USEPA adopted the NTR on December 22, 1992, and amended it on May 4, 1995, and November 9, 1999. About 40 criteria in the NTR and apply in California. On May 18, 2000, USEPA adopted the CTR. The CTR promulgated new toxics criteria for California and, in addition, incorporated the previously adopted NTR criteria that applied in the State. The CTR was amended on February 13, 2001. These rules contain water quality criteria (WQC) for priority toxic pollutants.

3. **State Implementation Policy.** On March 2, 2000, the State Water Board adopted the *Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California* (hereinafter State Implementation Policy [SIP]). The SIP became effective on April 28, 2000, with respect to the priority pollutant criteria promulgated through the NTR and to the WQOs established in the Basin Plan. The SIP became effective on May 18, 2000, with respect to the priority pollutant criteria promulgated through the CTR. The State Water Board adopted amendments to the SIP on February 24, 2005 that became effective on July 13, 2005. The SIP establishes implementation provisions for priority pollutant criteria and objectives and provisions for chronic toxicity control. Requirements of this Order implement the SIP.

4. **Alaska Rule.** On March 30, 2000, USEPA revised its regulation that specifies when new and revised state and tribal water quality standards (WQS) become effective for CWA purposes [65 Fed. Reg. 24641 (April 27, 2000), codified at 40 CFR 131.21]. Under the revised regulation (also known as the Alaska Rule), new and revised standards submitted to USEPA

after May 30, 2000, must be approved by USEPA before being used for CWA purposes. The final rule also provides that standards already in effect and submitted to USEPA by May 30, 2000, may be used for CWA purposes, whether or not approved by USEPA.

5. **Antidegradation Policy.** NPDES regulations at 40 CFR 131.12 require that state WQS include an antidegradation policy consistent with the federal policy. The State Water Board established California's antidegradation policy in State Water Board Resolution No. 68-16, which incorporates the federal antidegradation policy where the federal policy applies under federal law and requires that existing quality of waters be maintained unless degradation is justified based on specific findings. The Regional Water Board's Basin Plan implements, and incorporates by reference, both the State and federal antidegradation policies.

6. **Anti-Backsliding Requirements.** CWA sections 402(o)(2) and 303(d)(4) and 40 CFR 122.44(l) prohibit backsliding in NPDES permits. These anti-backsliding provisions require that effluent limitations in a reissued permit must be as stringent as those in the previous permit, with some exceptions in which limitations may be relaxed.

D. Impaired Water Bodies on CWA 303(d) List

In October 2011, pursuant to CWA section 303(d), USEPA approved a revised list of impaired water bodies prepared pursuant to CWA section 303(d), which requires identification of specific water bodies where it is expected that water quality standards will not be met after implementation of technology-based effluent limitations on point sources. Where it has not done so already, the Regional Water Board plans to adopt Total Maximum Daily Loads (TMDLs) for pollutants on the 303(d) list. TMDLs establish wasteload allocations for point sources and load allocations for non-point sources and are established to achieve the water quality standards for the impaired waterbodies.

Central San Francisco Bay is listed as an impaired waterbody. The pollutants impairing Central San Francisco Bay are chlordane, DDT, dieldrin, invasive species, dioxins and furans, mercury, PCBs, and selenium. On February 12, 2008, USEPA approved a TMDL for mercury in the San Francisco Bay. On March 29, 2010, USEPA approved a TMDL for PCBs in San Francisco Bay. Mercury and PCBs discharges from the Facility are regulated by Regional Water Board Order No. R2-2007- 0077, as amended by Regional Water Board Order No. R2-2011-0012, which implements the mercury and PCBs TMDLs.

IV. RATIONALE FOR EFFLUENT LIMITATIONS AND DISCHARGE SPECIFICATIONS

The CWA requires point source dischargers to control the amount of conventional, non-conventional, and toxic pollutants discharged into waters of the United States. The control of pollutants discharged is established through effluent limitations and other requirements in NPDES permits. There are two principal bases for effluent limitations in the NPDES regulations: 40 CFR 122.44(a) requires that permits include applicable technology-based limitations and standards; and 40 CFR 122.44(d) requires that permits include water quality-based effluent limitations (WQBELs) to attain and maintain applicable numeric and narrative WQC to protect the beneficial uses of the receiving water.

Several specific factors affecting the development of limitations and requirements in this Order are discussed below.

A. Discharge Prohibitions

1. **Discharge Prohibition III.A (No discharge other than that described in this Order):** This prohibition is based on 40 CFR 122.21(a), "Duty to Apply," and CWC section 13260, which requires filing an application and Report of Waste Discharge before a discharge can occur. Discharges not described in the permit application and Report of Waste Discharge, and subsequently in this Order, are prohibited.

2. **Discharge Prohibition III.B (Minimum initial dilution of 43:1):** The Order allows a dilution credit of 43:1 in the calculation of one or more water quality-based effluent limitations based on information of dilution achieved by the Discharger's current outfall. Therefore, this prohibition is necessary to ensure that the assumptions used to derive the dilution credit remain substantially the same so the limitations are protective of water quality.

3. **Discharge Prohibition III.C (Bypass or overflow of untreated or partially treated wastewaters to waters of the U.S. is prohibited, except as provided for in section I.G of Attachment D):** This prohibition is based on 40 CFR 122.41(m). See Federal Standard Provisions, Attachment D, section G. Bypasses are prohibited when flows to the Plant are below 30 MGD (the secondary treatment capacity of the Plant). When inflows are above 30 MGD, the Discharger may bypass secondary treatment for the portion above 30 MGD and recombine the bypassed flows with the secondarily-treated flow, disinfected, and discharged to San Francisco Bay. This process is also known as blending. As discussed below, the Discharger has shown that it meets the three criteria [40 CFR 122.41(m)(4)(i)(A)-(C)] required to allow blending:

   (A) Bypass is unavoidable to prevent loss of life, personal injury, or severe property damage. In its October 3, 2011, Utility Analysis, the Discharger determined that bypasses remain unavoidable to prevent backups and overflow of raw sewage in basements or on city streets, which could result in severe property damage or personal injury.

   (B) There are no feasible alternatives to the bypass. In its October 3, 2011, Utility Analysis, the Discharger completed a No Feasible Alternatives Analysis using the criteria identified in USEPA's *guidance* on *NPDES Permit Requirements for Peak Wet Weather Discharges from Publicly Owned Treatment Works Treatment Plant Serving Separate Sanitary Sewer Collection Systems* (December 2005). The analysis identified several measures to reduce blending, and the Discharger has implemented some of these measures. The Discharger completed significant capital improvement projects in 2010, including:

   - Enhancement to the Plant's grit system
   - Installation of a new grit classifier
   - Installation of two new headworks screens to enhance screening efficiency
   - Installation of aeration mixing and wash down piping at Grit Tank 3
   - Construction of two new primary clarifiers
   - Improvements for chemically-enhanced primary treatment capabilities
   - Installation of 22 valve and gate controllers within the aeration system for faster response time during wet weather conditions
   - Installation of two new concrete serpentine chlorine contact tanks

- Expansion of effluent storage pond from 3 million gallons to 7 million gallons and installation of new pond drain pumping system for “shaving” of peak flows
- Construction of two new sluice gates to control effluent discharge
- Construction of a new pump station to discharge effluent during high-tide conditions
- Structural inspection and rehabilitation of the marine outfall
- Cleaning of accumulated solids in the outfall diffuser to restore outfall capacity

The satellite collection agencies also continue to rehabilitate the collection systems. This will reduce inflow and infiltration, the primary cause of increased flow to the Plant during wet weather. These improvements should reduce blending.

Provision VI.C.5.a sets forth feasible actions for the Discharger to take within the next permit cycle to further reduce the need to blend.

(C) *The Discharger provided notice at least ten days before the date of the bypass.* This criterion is satisfied by the Regional Water Board’s public hearing regarding the adoption of this Order.

4. **Discharge Prohibition III.D (Average dry weather flow not to exceed 10.0 MGD):** This prohibition is based on the design treatment capacity of the Plant treatment system. Exceedance of the Plant’s average dry weather flow design capacity could result in lowering the reliability of achieving compliance with water quality requirements.

5. **Discharge Prohibition III.E (No sanitary sewer overflows):** Basin Plan Discharge Prohibition 15 (Table 4-1) and the CWA prohibit the discharge of wastewater to surface waters except as authorized under an NPDES permit. Publicly-owned treatment works must achieve secondary treatment at a minimum and any more stringent limitations necessary to meet water quality standards [33 U.S.C. § 1311 (b)(1)(B and C)]. A sanitary sewer overflow that results in the discharge of raw sewage, or wastewater not meeting this Order’s effluent limitations, to surface waters is therefore prohibited under the CWA and the Basin Plan.

B. Conventional and Non-Conventional Pollutant Limitations

1. Scope and Authority

CWA section 301(b) and 40 CFR 122.44 require that permits include conditions meeting technology-based requirements, at a minimum, and any more stringent effluent limitations necessary to meet applicable water quality standards. The discharge authorized by this Order must meet the minimum federal technology-based requirements based on Secondary Treatment Standards at 40 CFR 133, which are summarized below. The 30-day average percent removal for BOD_5 ($CBOD_5$) and TSS, by concentration, is not to be less than 85 percent. The Basin Plan contains additional requirements for certain pollutants.

Table F-6. Secondary Treatment Requirements

Parameters	Monthly Average	Weekly Average
BOD_5 [1]	30 mg/L	45 mg/L
$CBOD_5$ [1]	25 mg/L	40 mg/L
TSS	30 mg/L	45 mg/L
pH	6.0 – 9.0 standard units	

[1] At the option of the permitting authority, $CBOD_5$ effluent limitations may be substituted for BOD_5 limitations. The Regional Water Board has substituted $CBOD_5$ for BOD_5 in this Order.

2. Effluent Limitations for Conventional and Non-conventional Pollutants

a. **$CBOD_5$ and TSS**. The effluent limitations for $CBOD_5$ and TSS, including the 85 percent removal requirement, are required by the secondary treatment standards.

b. **Oil and Grease**. Basin Plan Table 4-2 requires effluent limitations for oil and grease.

c. **pH**. Secondary treatment standards and Basin Plan Table 4-2 require effluent limitations for pH.

d. **Total Chlorine Residual**. The residual chlorine effluent limitation is based on Basin Plan Table 4-2. The allowance for determination of false positives using continuous devices is based on the fact that continuous instruments occasionally have anomalous spikes, and it is chemically improbable to have free chlorine present in the presence of sodium bisulfite.

e. **Enterococcus Bacteria**. Enterococcus bacteria effluent limitations are based on Basin Plan Table 4-2A.

f. **Total Coliform Organisms**. The total coliform effluent limitations are based on Basin Plan Table 4-2A. The Central San Francisco Bay's beneficial uses include shellfish harvesting. Therefore, total coliform effluent limitations have been established.

C. Water Quality-Based Effluent Limitations (WQBELs) for Toxic Substances

WQBELs have been derived for toxic pollutants to implement WQOs that protect beneficial uses. Both the beneficial uses and the WQOs have been approved pursuant to federal law. The procedures for calculating individual WQBELs are based on the SIP and the Basin Plan. Most Basin Plan beneficial uses and WQOs were approved under State law and submitted to and approved by USEPA prior to May 30, 2000. Any WQOs and beneficial uses submitted to USEPA prior to May 30, 2000, but not approved by USEPA before that date, are nonetheless "applicable water quality standards for purposes of the [Clean Water] Act" pursuant to 40 CFR 131.21(c)(1). Collectively, this Order's restrictions on individual pollutants are no more stringent than those required by CWA water quality standards.

1. Scope and Authority

a. NPDES regulations at 40 CFR 122.44(d)(1)(i) mandate that permits include effluent limitations for all pollutants that are or may be discharged at levels that have reasonable potential to cause or contribute to an excursion of a water quality standard, including numeric and narrative objectives within a standard. As specified in 40 CFR 122.44(d)(1)(i), permits are required to include WQBELs for all pollutants "which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard."

The process for determining "reasonable potential" and calculating WQBELs when necessary is intended to protect the designated beneficial uses of the receiving water as specified in the Basin Plan, and achieve applicable WQOs contained in the CTR, NTR, and other state plans and policies.

b. NPDES regulations and the SIP provide the basis to establish Maximum Daily Effluent Limitations (MDELs) and Average Monthly Effluent Limitations (AMELs).

(1) NPDES Regulations. NPDES regulations at 40 CFR 122.45(d) state, "For continuous discharges all permit effluent limitations, standards, and prohibitions, including those necessary to achieve water quality standards, shall *unless impracticable* be stated as MDELs and AMELs for all discharges other than publicly owned treatment works."

(2) SIP. SIP section 1.4 requires WQBELs to be expressed as MDELs and AMELs.

c. MDELs are used in this Order to protect against acute water quality effects. The MDELs are necessary for preventing fish kills or mortality to aquatic organisms.

2. Beneficial Uses and WQOs

The WQOs applicable to the receiving water for this discharge are from the Basin Plan; the CTR, established by USEPA at 40 CFR 131.38; and the NTR, established by USEPA at 40 CFR 131.36. Some pollutants have WQOs from more than one of these sources.

a. Basin Plan. The Basin Plan specifies numeric WQOs for ten priority toxic pollutants, as well as narrative WQOs for toxicity and bioaccumulation in order to protect beneficial uses. The pollutants for which the Basin Plan specifies numeric objectives are arsenic, cadmium, chromium (VI), copper in marine and freshwater, lead, mercury, nickel, silver, zinc, and cyanide. The narrative toxicity objective states, "(a)ll waters shall be maintained free of toxic substances in concentrations that are lethal to or that produce other detrimental responses in aquatic organisms." The bioaccumulation objective states, "(c)ontrollable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered." Effluent limitations and provisions contained in this Order implement these objectives, based on available information.

b. CTR. The CTR specifies numeric aquatic life criteria for 23 priority toxic pollutants and numeric human health criteria for 57 priority toxic pollutants. These criteria apply to all inland surface waters and enclosed bays and estuaries of the San Francisco Bay Region, although Basin Plan Tables 3-3 and 3-4 include numeric objectives for certain of these priority toxic pollutants that supersede CTR criteria. Human health criteria are further identified as for "water and organisms" and for "organisms only." The CTR criteria applicable to "organisms only" apply to the receiving water because it is not a source of drinking water.

c. **NTR.** The NTR establishes numeric aquatic life criteria for selenium and numeric human health criteria for 33 toxic organic pollutants for waters of San Francisco Bay upstream to and including Suisun Bay and the Sacramento River-San Joaquin River Delta.

d. **Sediment Quality Objectives.** The *Water Quality Control Plan for Enclosed Bays and Estuaries – Part 1, Sediment Quality* contains a narrative WQO, "(p)ollutants in sediments shall not be present in quantities that, alone or in combination, are toxic to benthic communities in bays and estuaries of California." This WQO is to be implemented by integrating three lines of evidence: sediment toxicity, benthic community condition, and sediment chemistry. The policy requires that if the Regional Water Board determines that a discharge has reasonable potential to cause or contribute to an exceedance of this WQO, it is to impose the WQO as a receiving water limit.

e. **Basin Plan Receiving Water Salinity Policy.** The Basin Plan (like the CTR and the NTR) states that the salinity characteristics (i.e., freshwater vs. saltwater) of the receiving water are to be considered in determining the applicable WQOs. Freshwater criteria apply to discharges to waters with salinities equal to or less than one part per thousand (ppt) at least 95 percent of the time. Saltwater criteria apply to discharges to waters with salinities equal to or greater than 10 ppt at least 95 percent of the time in a normal water year. For discharges to water with salinities between these two categories, or tidally influenced freshwaters that support estuarine beneficial uses, the WQOs are the lower of the salt or freshwater WQOs (the latter calculated based on ambient hardness) for each substance.

   The receiving water for discharge from the facility is Central San Francisco Bay, an estuarine water body based on salinity data collected by the San Francisco Estuary Institute (SFEI) Regional Monitoring Program (RMP). Historically, the RMP conducted sampling at 26 locations throughout the San Francisco Bay region. In 2002, the system was redesigned to incorporate random sampling in place of the 26 established locations. Salinity data collected from February 1994 to August 2001 at the Red Rock Sampling Station (BC60) station indicate that the salinity was less than 1 ppt in zero percent of the samples and greater than 10 ppt in 78 percent of the samples in Central San Francisco Bay. Central San Francisco Bay is therefore classified as estuarine, and the reasonable potential analysis and effluent limitations in this Order are based on the more stringent of the fresh and saltwater WQOs.

f. **Receiving Water Hardness.** A single ambient hardness data point collected between 1993 and 2010 was available for the Red Rock (BC60) RMP station of 1,420 mg/L as $CaCO_3$. SIP and CTR RPA procedures cap hardness values at 400 mg/L as $CaCO_3$. Thus, to calculate the freshwater WQOs for hardness dependent metals for use in the RPA, a hardness value of 400 mg/L as $CaCO_3$ was used.

g. **Site-Specific Metals Translators.** NPDES regulations at 40 CFR 122.45(c) require that effluent limitations for metals be expressed as total recoverable metal. Since applicable WQOs for metals are typically expressed as dissolved metal, translators must be used to convert metals concentrations from dissolved to total recoverable and vice versa. The CTR includes default translators; however, site-specific conditions, such as water temperature, pH, suspended solids, and organic carbon greatly affect the form of metal (dissolved, non-filterable, or otherwise) present in the water and therefore available to cause toxicity. In general, the dissolved form of the metal is more available and more toxic to aquatic life than non-filterable forms. Site-specific translators can be developed to account for site-specific conditions, thereby preventing exceedingly stringent or under protective WQOs. For deep water discharges to Central San Francisco Bay, the Basin Plan translators for copper are 0.73 (AMEL) and 0.87 (MDEL). In addition, for deep water discharges to San Francisco Bay, a site-specific translator study for copper and nickel was conducted by the Clean Area Partnership (*North of Dumbarton Bridge Copper and Nickel Development and Selection of Final Translators* (2005)). The study used samples from four sampling events at 13 stations between 2000 and 2001. The previous permit included copper and nickel translators based on this copper and nickel translator study. The translators for nickel (0.65 [AMEL] and 0.85 [MDEL]) have been carried over to this Order for the purpose of the RPA.

3. Determining the Need for WQBELs

Assessing whether a pollutant has reasonable potential to exceed a WQO in the water body is the fundamental step in determining whether or not a WQBEL is required.

a. Reasonable Potential Methodology

For priority pollutants and most other toxic pollutants, the reasonable potential analysis (RPA) identifies the observed maximum effluent concentration (MEC) for each pollutant based on effluent concentration data. There are three triggers in determining reasonable potential according to SIP section 1.3:

(1) The first trigger (Trigger 1) is activated if the MEC is greater than or equal to the lowest applicable WQO (MEC $\geq$ WQO), which has been adjusted, if appropriate, for pH, hardness, and translator data. If the MEC is greater than or equal to the adjusted WQO, then that pollutant has reasonable potential, and a WQBEL is required.

(2) The second trigger (Trigger 2) is activated if the observed maximum ambient background concentration (B) is greater than the adjusted WQO (B > WQO) and the pollutant is detected in any of the effluent samples.

(3) The third trigger (Trigger 3) is activated if a review of other information determines that a WQBEL is required to protect beneficial uses, even though both MEC and B are less than the WQO.

b. Effluent Data

The Discharger's priority pollutant data and the nature of the discharge were analyzed to determine if the discharge has reasonable potential. The RPA is based on effluent monitoring data the Discharger collected from April 2007 through March 2011.

c. Ambient Background Data

The SIP states that, for calculating WQBELs, ambient background concentrations are either the observed maximum ambient water column concentrations or, for objectives intended to protect human health from carcinogenic effects, the arithmetic mean of observed ambient water concentrations.

On May 15, 2003, a group of San Francisco Bay Region dischargers known as the Bay Area Clean Water Agencies, or BACWA, submitted a collaborative receiving water study entitled *San Francisco Bay Ambient Water Monitoring Interim Report* (2003). This study included monitoring results from sampling events in 2002 and 2003 for priority pollutants not monitored by the RMP. This study included the Yerba Buena Island RMP station. The BACWA provided additional data through its *Ambient Water Monitoring: Final CTR Sampling Update* report, dated June 15, 2004.

For priority pollutants, the RPA was conducted and WQBELs were calculated using RMP data from 1993 through 2009 at the Yerba Buena Island RMP station (BC10), and additional data from the BACWA study.

For ammonia, the RPA was conducted and WQBELs were calculated using RMP data from 1994 through 2001 at the Red Rock Station (BC60).

d. RPA for Toxic Pollutants

The MECs, most stringent applicable WQOs, and background concentrations used in the RPA are presented in the following table, along with the RPA results (yes or no) for each pollutant. Reasonable potential was not determined for all pollutants because there are not applicable WQOs for all pollutants and monitoring data are not available for others. Based on a review of the effluent data collected during the previous permit term from September 2007 through March 2011, the pollutants that exhibit reasonable potential at Discharge Point No. 001 are cyanide and total ammonia by Trigger 1; dioxin-TEQ by Trigger 3; and copper by Trigger 1 and Trigger 3.

Table F-7. Reasonable Potential Analysis Summary

CTR #	Priority Pollutants	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Results [3]
1	Antimony	4,300	0.8	1.8	No
2	Arsenic	36	4	2.5	No
3	Beryllium	No Criteria	<0.006	0.22	Ud
4	Cadmium	3.37	0.1	0.13	No
5a	Chromium (III)	644	Not Available	Not Available	No
5b	Chromium, Total	11	2.6	4.4	No
6	Copper	8.2	11	2.5	Yes
7	Lead	8.5	1	0.8	No
9	Nickel	13	7.1	3.7	No
10	Selenium (303(d) listed)	5.0	3	0.39	No
11	Silver	5.4	0.95	0.052	No
12	Thallium	6.3	0.8	0.21	No
13	Zinc	86	84	5.1	No
14	Cyanide	2.9	4.9	<0.4	Yes
15	Asbestos	No Criteria		Not Available	Ud
16	2,3,7,8-TCDD (303(d) listed)	0.000000014	<4.9×10^{-12}	2.7×10^{-8}	No
	Dioxin TEQ (303(d) listed)	0.000000014	6.3×10^{-9}	5.3×10^{-8}	Yes
17	Acrolein	780	<1.2	<0.50	No
18	Acrylonitrile	0.66	<0.58	0.03	No
19	Benzene	71	<0.1	<0.05	No
20	Bromoform	360	<0.15	<0.5	No
21	Carbon Tetrachloride	4.4	<0.06	0.06	No

CTR #	Priority Pollutants	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Results [3]
22	Chlorobenzene	21,000	<0.1	<0.5	No
23	Chlorodibromomethane	34	0.5	<0.05	No
24	Chloroethane	No Criteria	<0.11	<0.5	Ud
25	2-Chloroethylvinyl ether	No Criteria	<0.28	<0.5	Ud
26	Chloroform	No Criteria	1.9	<0.5	Ud
27	Dichlorobromomethane	46	0.4	<0.05	No
28	1,1-Dichloroethane	No Criteria	<0.06	<0.05	Ud
29	1,2-Dichloroethane	99	<0.09	0.04	No
30	1,1-Dichloroethylene	3.2	<0.07	<0.5	No
31	1,2-Dichloropropane	39	<0.07	<0.05	No
32	1,3-Dichloropropylene	1,700	<0.16	<0.5	No
33	Ethylbenzene	29,000	<0.09	<0.5	No
34	Methyl Bromide	4,000	0.09	<0.5	No
35	Methyl Chloride	No Criteria	0.09	<0.5	Ud
36	Methylene Chloride	1,600	1.4	22	No
37	1,1,2,2-Tetrachloroethane	11	<0.07	<0.05	No
38	Tetrachloroethylene	8.85	0.6	<0.05	No
39	Toluene	200,000	0.3	<0.3	No
40	1,2-Trans-Dichloroethylene	140,000	<0.09	<0.5	No
41	1,1,1-Trichloroethane	No Criteria	<0.11	<0.5	Ud
42	1,1,2-Trichloroethane	42	<0.06	<0.05	No
43	Trichloroethylene	81	<0.07	<0.5	No
44	Vinyl Chloride	525	<0.14	<0.5	No
45	2-Chlorophenol	400	<0.8	<1.2	No
46	2,4-Dichlorophenol	790	<0.99	<1.3	No
47	2,4-Dimethylphenol	2,300	<0.8	<1.3	No
48	2-Methyl- 4,6-Dinitrophenol	765	<0.6	<1.2	No
49	2,4-Dinitrophenol	14,000	<0.6	<0.7	No
50	2-Nitrophenol	No Criteria	<0.6	<1.3	Ud
51	4-Nitrophenol	No Criteria	<0.7	<1.6	Ud
52	3-Methyl 4-Chlorophenol	No Criteria	<0.6	<1.1	Ud
53	Pentachlorophenol	3.31	<0.6	<1	No
54	Phenol	4,600,000	<0.6	<1.3	No
55	2,4,6-Trichlorophenol	6.5	<0.6	<1.3	No
56	Acenaphthene	2,700	<0.03	0.0019	No
57	Acenaphthylene	No Criteria	<0.02	0.0013	Ud
58	Anthracene	110,000	<0.02	0.00059	No
59	Benzidine	0.00054	<5	<0.0015	No
60	Benzo(a)Anthracene	0.049	<0.02	0.0053	No
61	Benzo(a)Pyrene	0.049	<0.02	0.0033	No
62	Benzo(b)Fluoranthene	0.049	<0.02	0.0046	No
63	Benzo(ghi)Perylene	No Criteria	<0.02	0.0045	Ud
64	Benzo(k)Fluoranthene	0.049	<0.03	0.0018	No
65	Bis(2-Chloroethoxy)Methane	No Criteria	<0.7	<0.3	Ud
66	Bis(2-Chloroethyl)Ether	1.4	<0.9	<0.3	No
67	Bis(2-Chloroisopropyl)Ether	170000	<0.6	Not Available	No
68	Bis(2-Ethylhexyl)Phthalate	5.9	2.6	<0.00015	No
69	4-Bromophenyl Phenyl Ether	No Criteria	<0.00000097	<0.23	Ud
70	Butylbenzyl Phthalate	5,200	<0.0000007	0.0056	No
71	2-Chloronaphthalene	4,300	<0.00000098	<0.3	No
72	4-Chlorophenyl Phenyl Ether	No Criteria	<0.00000099	<0.3	Ud
73	Chrysene	0.049	<0.00000002	0.0028	No
74	Dibenzo(a,h)Anthracene	0.049	<0.00000002	0.00064	No

CTR #	Priority Pollutants	Governing WQO (µg/L)	MEC or Minimum DL [1][2] (µg/L)	Maximum Background or Minimum DL [1][2] (µg/L)	RPA Results [3]
75	1,2-Dichlorobenzene	17,000	<0.00000027	<0.3	No
76	1,3-Dichlorobenzene	2,600	<0.00000018	<0.3	No
77	1,4-Dichlorobenzene	2,600	<0.00000018	<0.3	No
78	3,3 Dichlorobenzidine	0.077	<0.000001	<0.001	No
79	Diethyl Phthalate	120,000	<0.0000006	<0.21	No
80	Dimethyl Phthalate	2,900,000	<0.0000007	<0.21	No
81	Di-n-Butyl Phthalate	12,000	<0.0000006	0.016	No
82	2,4-Dinitrotoluene	9.1	<0.0000006	<0.27	No
83	2,6-Dinitrotoluene	No Criteria	<0.0000006	<0.29	Ud
84	Di-n-Octyl Phthalate	No Criteria	<0.0000007	<0.38	Ud
85	1,2-Diphenylhydrazine	0.54	<0.6	0.0037	No
86	Fluoranthene	370	<0.02	0.011	No
87	Fluorene	14000	<0.02	0.0021	No
88	Hexachlorobenzene	0.00077	<0.91	0.000022	No
89	Hexachlorobutadiene	50	<0.92	<0.3	No
90	Hexachlorocyclopentadiene	17,000	<0.8	<0.3	No
91	Hexachloroethane	8.9	<0.94	<0.2	No
92	Indeno(1,2,3-cd)Pyrene	0.049	<0.02	0.0040	No
93	Isophorone	600	<0.8	<0.3	No
94	Naphthalene	No Criteria	<0.02	0.013	Ud
95	Nitrobenzene	1900	<0.7	<0.25	No
96	N-Nitrosodimethylamine	8.1	<0.8	<0.3	No
97	N-Nitrosodi-n-Propylamine	1.4	<0.6	<0.001	No
98	N-Nitrosodiphenylamine	16	<0.6	<0.001	No
99	Phenanthrene	No Criteria	<0.02	0.0095	Ud
100	Pyrene	11,000	<0.02	0.019	No
101	1,2,4-Trichlorobenzene	No Criteria	<0.98	<0.3	Ud
102	Aldrin	0.00014	<0.003	2.8×10^{-6}	No
103	Alpha-BHC	0.013	<0.002	0.00050	No
104	Beta-BHC	0.046	<0.002	0.00041	No
105	Gamma-BHC	0.063	<0.002	0.00070	No
106	Delta-BHC	No Criteria	<0.002	0.000053	Ud
107	Chlordane (303(d) listed)	0.00059	<0.02	0.00018	No
108	4,4'-DDT (303(d) listed)	0.00059	<0.003	0.00017	No
109	4,4'-DDE (linked to DDT)	0.00059	<0.003	0.00069	No
110	4,4'-DDD	0.00084	<0.003	0.00031	No
111	Dieldrin (303d listed)	0.00014	<0.002	0.00026	No
112	Alpha-Endosulfan	0.0087	<0.003	0.000031	No
113	beta-Endosulfan	0.0087	<0.003	0.000069	No
114	Endosulfan Sulfate	240	<0.003	0.000082	No
115	Endrin	0.0023	<0.002	0.000040	No
116	Endrin Aldehyde	0.81	<0.002	Not Available	No
117	Heptachlor	0.00021	<0.003	0.000019	No
118	Heptachlor Epoxide	0.00011	<0.002	0.000094	No
126	Toxaphene	0.0002	<0.19	Not Available	No
	Total Ammonia	1400	46000	150	Yes

[1] The maximum effluent concentration (MEC) and maximum background concentration are the actual detected concentrations unless preceded by a "<" sign, in which case the value shown is the minimum detection level (DL).

[2] The MEC or maximum background concentration is "Not Available" when there are no monitoring data for the constituent.

[3] RPA Results = Yes, if MEC > WQC, B > WQC and MEC is detected, or Trigger 3;
= No, if MEC and B are < WQC or all effluent data are undetected;
= Undetermined (Ud), if no criteria have been promulgated or there are insufficient data.

e. **Constituents with limited data.** In some cases, reasonable potential cannot be determined because effluent data are limited or ambient background concentrations are unavailable. The Discharger will continue to monitor for these constituents in the effluent using analytical methods that provide the best feasible detection limits. When additional data become available, further RPA will be conducted to determine whether numeric effluent limitations are necessary.

f. **Pollutants with No Reasonable Potential.** WQBELs are not included in this Order for constituents that do not demonstrate reasonable potential; however, monitoring for those pollutants is still required. If concentrations of these constituents are found to have increased significantly, the Discharger will be required to investigate the sources of the increases. Remedial measures are required if the increases pose a threat to receiving water quality.

g. **RPA for Sediment Quality Objective.** Pollutants in some receiving water sediments may be present in quantities that alone or in combination are toxic to benthic communities. Efforts are underway to identify stressors causing such conditions. However, to date there is no evidence directly linking compromised sediment conditions to the discharges subject to this Order; therefore the Regional Water Board cannot draw a conclusion about reasonable potential for the discharges to cause or contribute to exceedances of the sediment quality objectives. Nevertheless, the Discharger continues to participate in the RMP, which monitors San Francisco Bay sediment and seeks to identify stressors responsible for degraded sediment quality. Thus far, the monitoring has provided only limited information about potential stressors and sediment transport. The Regional Water Board is exploring options for obtaining additional information that may inform future RPAs.

4. WQBEL Calculations

a. **Pollutants with Reasonable Potential.** WQBELs were developed for the toxic and priority pollutants determined to have reasonable potential to cause or contribute to exceedances of the WQOs. The WQBELs were calculated based on WQOs and the procedures specified in SIP section 1.4. The WQOs used for each pollutant with reasonable potential are discussed below.

b. **Dilution Credit.** The SIP allows dilution credits for completely-mixed discharges and, under certain circumstances, for incompletely-mixed discharges. The Discharger submitted a *Mixing Zone Study Report for the Central Marin Sanitation Agency Outfall Diffuser to Central San Francisco Bay*, dated September 29, 2011. The report presents findings regarding the initial dilution of the discharge at the outfall.

The far-field dilution was estimated using the USEPA-supported Visual Plumes/DKHW modeling package. The study used the maximum wet weather effluent flow rate observed during the previous permit term (67.2 MGD) and ambient conditions observed on April 11, 2006. The ambient profile was selected because the observed difference in salinity over the top 16 feet represented a period of maximum stratification near slack tide. This condition is considered conservative.

The study found that a dilution factor of 43:1 is achieved at the end of the zone of initial dilution, occurring within approximately 13 feet of the outfall.

i. **Bioaccumulative Pollutants:** For certain bioaccumulative pollutants, dilution credit is significantly restricted or denied. This determination is based on available data on concentrations of these pollutants in aquatic organisms, sediment, and the water column. Specifically, these pollutants include chlordane, DDT, dieldrin, dioxin compounds, furan compounds, mercury, PCBs, selenium, and dioxin-like PCBs, which all appear on the CWA section 303(d) list for Central San Francisco Bay because they impair beneficial uses. The following factors suggest insufficient assimilative capacity in San Francisco Bay for these pollutants.

   Tissue samples taken from fish in San Francisco Bay show the presence of these pollutants at concentrations greater than screening levels (*Contaminant Concentrations in Fish from San Francisco Bay*, May 1997). The results of a 1994 San Francisco Bay pilot study, presented in *Contaminated Levels in Fish Tissue from San Francisco Bay* (Regional Water Board, 1994) also showed elevated levels of chemical contaminants in fish tissues. The Office of Environmental Health and Hazard Assessment completed a preliminary review of the data in the 1994 report and in December 1994 issued an interim consumption advisory covering certain fish species in San Francisco Bay due to the levels of some of these pollutants, including dioxins and pesticides (e.g. DDT). OEHHA updated this advisory by issuing its May 2011 report *Health Advisory and Safe Eating Guidelines for San Francisco Bay Fish and Shellfish*, which still suggests insufficient assimilative capacity in San Francisco Bay for 303(d)-listed pollutants. Therefore, dilution credits are denied for bioaccumulative pollutants on the 303(d) list for which there is lack of data on sources and significant uncertainty about how different sources of these pollutants contribute to bioaccumulation.

ii. **Non-Bioaccumulative Pollutants:** For non-bioaccumulative pollutants (except ammonia), a conservative dilution allowance of 10:1 (D = 9) has been assigned. The 10:1 dilution allowance is consistent with the previous permit and is based, in part, on Basin Plan Prohibition 1 (Table 4-1), which prohibits discharges with less than 10:1 dilution. SIP section 1.4.2 allows for limiting the dilution credit:

   (1) A far-field background station is appropriate because San Francisco Bay is a very complex estuarine system with highly variable and seasonal upstream freshwater inflows and diurnal tidal saltwater inputs. SIP section 1.4.3 allows background conditions to be determined on a discharge-by-discharge or water body-by-water body basis. A water body-by-water body basis approach is taken here due to inherent uncertainties in characterizing ambient background conditions in a complex estuarine system on a discharge-by-discharge basis. The Yerba Buena Island RMP monitoring station, relative to other RMP stations, fits SIP guidance criteria for establishing background conditions. The SIP requires that background water quality data be representative of the ambient receiving water that will mix with the discharge. Water quality data from the Yerba Buena Island monitoring station is representative of the water that will mix with the discharge.

(2) Because of the complex hydrology of San Francisco Bay, a mixing zone has not been established. There are uncertainties in accurately determining an appropriate mixing zone. The models used to predict dilution have not considered the three dimensional nature of San Francisco Bay currents resulting from the interaction of tidal flushes and seasonal fresh water outflows. Being heavier and colder than fresh water, ocean salt water enters San Francisco Bay on a twice-daily tidal cycle, generally beneath the warmer fresh water that flows seaward. When these waters mix and interact, complex circulation patterns occur due to the varying densities of the fresh and ocean waters. The complex patterns occur throughout San Francisco Bay, but are most prevalent in the San Pablo Bay, Carquinez Strait, and Suisun Bay areas. The locations of this mixing and interaction change, depending on the strength of each tide. Additionally, sediment loads from the Central Valley change on a long-term basis, affecting the depth of different parts of San Francisco Bay, resulting in alteration of flow patterns, mixing, and dilution at the outfall.

(3) For ammonia, a conservative estimated actual initial dilution was used to calculate the effluent limitations. This is justified because ammonia, a non-persistent pollutant, quickly disperses and degrades to a non-toxic state, and cumulative toxicity effects are unlikely. As described above, the Discharger used USEPA's Visual Plumes model to determine an available dilution of up to 43:1 is provided within 13 feet of the discharge location. The study estimated actual initial dilution ratio to be 43:1 (D = 42) at the peak flow rate of 67.2 MGD. The dilution ratio was calculated assuming slack tide conditions.

c. Development of WQBELs for Specific Pollutants

(1) Copper

(a) WQOs. The Basin Plan contains chronic and acute marine WQOs for copper of 6.0 micrograms per liter (µg/L) and 9.4 µg/L, respectively, expressed as dissolved metal (site-specific objectives for San Francisco Bay). These WQOs were converted to total recoverable metal using the site-specific translators of 0.73 (chronic) and 0.87 (acute), as described in section IV.C.2.g. The resulting acute WQO is 10.8 µg/L and chronic WQO is 8.2 µg/L.

(b) RPA Results. This Order establishes effluent limitations for copper because the MEC (11 µg/L) exceeds the governing WQO (8.2 µg/L), demonstrating reasonable potential by Trigger 1. Reasonable potential is also established by Trigger 3, consistent with Basin Plan section 7.2.

(c) WQBELs. WQBELs for copper, calculated according to SIP procedures with an effluent data coefficient of variation (CV) of 0.43 and a dilution credit of D = 9 (dilution ratio = 10:1), are an AMEL of 49 µg/L and an MDEL of 85 µg/L.

(d) Anti-backsliding. The copper limits in this Order are less stringent than those the previous order because they were calculated based on SSOs. CWA section 303(d)(4)(B) allows effluent limits to be revised for water bodies that meet water quality standards if such revisions are consistent with antidegradation policies.

Central San Francisco Bay meets its copper WQOs and the SSOs were designed to be protective of beneficial uses. Furthermore, the Basin Plan requires copper action plans for all discharges to the Central San Francisco Bay. Therefore, the Bay will not be degraded by copper discharges, antidegradation policies have been met, and revised copper limits are appropriate.

(2) Cyanide

(a) WQOs. The Basin Plan contains chronic and acute marine WQOs for cyanide of 2.9 µg/L and 9.4 µg/L, respectively (site-specific objectives for San Francisco Bay).

(b) RPA Results. This Order establishes effluent limitations for cyanide because the MEC (4.9 µg/L) exceeds the governing WQO (2.9 µg/L), demonstrating reasonable potential by Trigger 1.

(c) WQBELs. WQBELs for cyanide, calculated according to SIP procedures with an effluent data CV of 0.43 and a dilution credit of D = 9, are an AMEL of 22 µg/L and an MDEL of 38 µg/L. The previous permit established effluent limitations that were more stringent than the newly calculated effluent limitations for cyanide. The more stringent effluent limitations of 21 µg/L (AMEL) and 41 µg/L (MDEL) have been retained in this Order.

(d) Anti-backsliding. Anti-backsliding requirements are satisfied because the limits for cyanide are the same as the limits in the previous permit.

(3) Dioxin – TEQ

(a) WQO. The Basin Plan narrative WQO for bioaccumulative substances states, "(m)any pollutants can accumulate on particulates, in sediments, or bioaccumulate in fish and other aquatic organisms. Controllable water quality factors shall not cause a detrimental increase in concentrations of toxic substances found in bottom sediments or aquatic life. Effects on aquatic organisms, wildlife, and human health will be considered."

Because it is the consensus of the scientific community that dioxins and furans associate with particulates, accumulate in sediments, and bioaccumulate in the fatty tissue of fish and other organisms, the Basin Plan's narrative bioaccumulation WQO is applicable to these pollutants. Elevated levels of dioxins and furans in fish tissue in San Francisco Bay demonstrate that the narrative bioaccumulation WQO is not being met. USEPA has therefore included Central San Francisco Bay as impaired by dioxin and furan compounds in the current 303(d) listing of receiving waters, where water quality objectives are not being met after imposition of applicable technology-based requirements.

The CTR establishes a numeric WQO for 2,3,7,8-tetrachlorinated dibenzo-p-dioxin (2,3,7,8-TCDD) of 1.4×10^{-8} µg/L for the protection of human health, when aquatic organisms are consumed. When the CTR was promulgated, USEPA stated its support of the regulation of other dioxin and dioxin-like compounds through the use of toxicity equivalencies (TEQs) in NPDES permits. For California waters, USEPA stated specifically, “if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of a narrative criterion, numeric WQBELs for dioxin or dioxin-like compounds should be included in NPDES permits and should be expressed using a TEQ scheme” [65 Fed. Reg. 31682, 31695 (2000)].

This Order uses a TEQ scheme based on a set of toxicity equivalency factors (TEFs) the World Health Organization (WHO) developed in 1998, and a set of bioaccumulation equivalency factors (BEFs) USEPA developed for the Great Lakes region (40 CFR 132, Appendix F) to convert the concentration of any congener of dioxin or furan into an equivalent concentration of 2,3,7,8-TCDD. The CTR criterion is used as a criterion for dioxin-TEQ because dioxin-TEQ represents a toxicity weighted concentration equivalent to 2,3,7,8-TCDD, thus translating the narrative bioaccumulation objective into a numeric criterion appropriate for the RPA.

To determine if the discharge of dioxin or dioxin-like compounds has reasonable potential to cause or contribute to a violation of the Basin Plan’s narrative bioaccumulation WQO, TEFs and BEFs were used to express the measured concentrations of 16 dioxin congeners in effluent and background samples as 2,3,7,8-TCDD. These “equivalent” concentrations were then compared to the CTR numeric criterion for 2,3,7,8-TCDD (1.4×10^{-8} µg/L). Although the 1998 WHO scheme includes TEFs for dioxin-like PCBs, they are not included in this Order’s TEQ scheme. The CTR has established a specific water quality standard for PCBs, and dioxin-like PCBs are included in the analysis of total PCBs.

(b) **RPA Results.** Dioxin-TEQ has been detected in the effluent and the receiving waters are listed as impaired due to dioxin and furan bioaccumulations within the food web. Because the dioxin-TEQ in the discharge could cause or contribute to an exceedance of the Basin Plan’s bioaccumulation WQO, there is reasonable potential based on Trigger 3.

(c) **WQBELs.** WQBELs for dioxin-TEQ, calculated according to SIP procedures with a default CV of 0.6 and no dilution credit, are an AMEL of 1.4×10^{-8} µg/L and an MDEL of 2.8×10^{-8} µg/L.

(d) **Anti-backsliding.** Anti-backsliding requirements are satisfied because the limits for dioxin-TEQ are new. The previous permit specified the same limits, which were to go into effect on April 1, 2017.

(4) Total Ammonia

(a) **WQOs.** The Basin Plan contains WQOs for un-ionized ammonia of 0.025 mg/L as an annual median and 0.16 mg/L as a maximum upstream of the San Francisco Bay Bridge. These WQOs were translated from un-ionized ammonia concentrations to equivalent total ammonia concentrations (as nitrogen) since (1) sampling and laboratory methods are not available to analyze for un-ionized ammonia; and (2) the fraction of total ammonia that exists in the toxic un-ionized form depends on the pH, salinity, and temperature of the receiving water.

To translate the Basin Plan un-ionized ammonia objective, Regional Water Board staff used pH, salinity, and temperature data from 1994 through 2001 from the nearest RMP station to the outfall, the Red Rock RMP Station (BC60). Regional Water Board staff used the following equations to determine the fraction of total ammonia that would exist in the toxic un-ionized form in the estuarine receiving water where the various measurements were taken from 1994-2001 (USEPA, 1989, *Ambient Water Quality Criteria for Ammonia (Saltwater)–1989*, EPA Publication 440/5-88-004):

For salinity > 10 ppt: fraction of $NH_3 = \dfrac{1}{1+10^{(pK-pH)}}$

Where:

$$pK = 9.245 + 0.116(I) + 0.0324\,(298 - T) + \frac{0.0415(P)}{(T)}$$

$$I = \text{Molal ionic strength of saltwater} = \frac{19.9273(S)}{(1{,}000 - 1.005109(S))}$$

S = Salinity (parts per thousand)

T = Temperature in degrees Kelvin

P = Pressure (one atmosphere)

The 90th percentile and median un-ionized ammonia fractions were then used to express the daily maximum and the annual average un-ionized objectives as acute and chronic total ammonia objectives, respectively. This approach is consistent with USEPA guidance on translating dissolved metal WQOs to total recoverable metal WQOs (USEPA, 1996, *The Metals Translator: Guidance for Calculating a Total Recoverable Limit from a Dissolved Criterion*, EPA Publication 823-B-96-007.)

The equivalent total ammonia acute and chronic WQOs are 5.28 mg/L and 1.38 mg/L, respectively.

(b) **RPA Results.** Basin Plan section 4.5.5.2 indicates that WQBELs are to be calculated for toxic pollutants according to the SIP. Basin Plan section 3.3.20 refers to ammonia as a toxic pollutant. Therefore, the SIP methodology was used to perform the RPA and to calculate effluent limitations for ammonia. This Order establishes effluent limitations for total ammonia because the MEC of 46.1 mg/L (as nitrogen) exceeds the most stringent applicable translated WQO for this pollutant (1.38 mg/L), demonstrating reasonable potential by Trigger 1.

(c) **WQBELs.** Total ammonia WQBELs were calculated separately for acute and chronic conditions. The WQBELs are based on the more stringent chronic results.

The WQBELs, calculated according to SIP procedures with an effluent data CV of 0.41 and dilution credit of D=42 (dilution ratio = 43:1), are an AMEL of 60 mg/L and an MDEL of 120 mg/L.

Statistical adjustments were made to the total ammonia WQBEL calculations because:

- the Basin Plan's chronic WQO for un-ionized ammonia is based on an annual median instead of the typical 4-day average; and

- the SIP assumes a 4-day average concentration and a monthly sampling frequency of 4 days per month to calculate effluent limitations based on chronic criteria, whereas a 365-day average and a monitoring frequency of 30 days per month (the maximum daily sampling frequency in a month since the averaging period for the chronic criteria is longer than 30 days) were used.

These statistical adjustments are supported by USEPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia,* published on December 22, 1999, in the Federal Register. Following the SIP methodology, the maximum ambient background total ammonia concentration (0.146 mg/L) was used to calculate effluent limitations based on the acute criterion, and the median background total ammonia concentration (0.079 mg/L) to calculate effluent limitations based on the chronic criterion. Because the Basin Plan's chronic un-ionized ammonia objective is an annual median, the median background concentration is more representative of ambient conditions than a daily maximum.

(d) **Anti-backsliding.** Anti-backsliding requirements are satisfied because the previous permit did not include WQBELs for total ammonia.

e. Effluent Limit Calculations

The following table shows the WQBEL calculations for copper, cyanide, dioxin-TEQ, and total ammonia.

Table F-8. WQBEL Calculations

Pollutant	**Copper**	**Cyanide**	**Dioxin-TEQ**	**Ammonia (acute)**	**Ammonia (chronic)**
Units	µg/L	µg/L	µg/L	mg/L-N	mg/L-N
Basis and Criteria Type	BP SSOs	BP SSOs	BP narrative	BP aquatic life	BP aquatic life
Criteria – Acute	3.9	9.4	---	5.28	
Criteria – Chronic	2.5	2.9	---	---	1.38
HH criteria	---	2.2E+05	1.4E-08	---	---
Water Effects Ratio	2.4	1	1	1	1
Lowest WQO	2.5	2.9	1.4E-08	5.28	1.38
Site Specific Translator - MDEL	0.87	---	---	---	---
Site Specific Translator – AMEL	0.73	---	---	---	---
Dilution Factor (D)	9	9	0	42	42
No. of samples per month	4	4	4	4	30
Aquatic life analysis required?	Y	Y	N	Y	Y

HH analysis required?	N	Y	Y	N	N
Applicable Acute WQO	10.8	9.4	---	5.28	---
Applicable Chronic WQO	8.2	2.9	---	---	1.38
Background	2.6	0.4	5.32E-08	0.146	0.079
Is the pollutant on the 303(d) list?	N	N	Y	N	N
ECA acute	85	90.4	---	221	---
ECA chronic	59	25.4	---	---	56
ECA human health	---	2.2E+06	1.4E-08	---	---
No. of data points <10, or at least 80% non-detect	N	N	N	N	N
Average effluent concentration	4.4	2.7	1.4E-09	25.3	25.3
Standard Deviation	1.9	1.14	2.4E-09	10.3	10.3
CV calculated	0.43	0.43	0.6	0.41	0.41
CV selected	0.43	0.43	0.6	0.41	0.41
ECA acute mult99	0.42	0.42	---	0.43	---
ECA chronic mult99	0.62	0.62	---		0.95
LTA acute	35.4	37.6	---	96.1	---
LTA chronic	37.0	15.8	---	---	53.1
Minimum LTA	35.4	15.8	---	91.1	53.1
AMEL mult95	1.4	1.4	2.6	1.3	1.1
MDEL mult99	2.4	2.4	7.8	2.2	2.2
AMEL aquatic life	49	22	---	120	53
MDEL aquatic life	85	38	---	200	110
MDEL/AMEL multiplier	---	1.7	3.0	---	---
AMEL human health	---	2.2E+06	1.4E-08	---	---
MDEL human health	---	3.8E+06	2.8E-08	---	---
Current Permit - AMEL	13	21	1.4E-08	---	---
Current Permit - MDEL	22	41	2.8E-08	---	---
Final limit - AMEL	**49**	**21**	**1.4E-08**		**60**
Final limit - MDEL	**85**	**41**	**2.8E-08**		**120**

5. Whole Effluent Acute Toxicity

This Order includes effluent limitations for whole effluent acute toxicity based on Basin Plan Table 4-3. All bioassays are to be performed according to the USEPA approved method in 40 CFR 136, currently *Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms*, 5th Edition. The approved test species currently specified in the Monitoring and Reporting Program (Attachment E) is rainbow trout.

6. Whole Effluent Chronic Toxicity

a. **Toxicity Objective.** Basin Plan section 3.3.18 states, "(t)here shall be no chronic toxicity in ambient waters. Chronic toxicity is a detrimental biological effect on growth rate, reproduction, fertilization success, larval development, population abundance, community composition, or any other relevant measure of the health of an organism, population, or community."

b. Reasonable Potential Analysis. The previous permit included chronic toxicity triggers of a single sample maximum of 20 TUc and a 3-sample median of 10 TUc, which would trigger accelerated chronic toxicity testing if exceeded. The Discharger conducted chronic toxicity testing every 6 months during the previous permit term using *Pimephales promelas*. Chronic toxicity testing results from March 2007 through March 2011 indicate the maximum single sample result was 2.9 TUc, and the maximum 3-sample median was <2.9 TUc. These low toxicity values indicate low reasonable potential for chronic toxicity so there is only a narrative chronic toxicity limit in this Order.

c. Permit Requirements. Chronic toxicity requirements are based on the narrative Basin Plan toxicity objective and are unchanged from the previous permit.

d. Screening Phase Study and Monitoring Requirement. The Discharger is required to conduct a chronic toxicity screening phase study, as described in MRP Appendix E-1 (Attachment E) prior to permit issuance. The Discharger's August 23, 2011, chronic toxicity screening study indicated that *Americamysis bahia* (mysid shrimp) was the most sensitive species. The MRP specifies that *Americamysis bahia* shall be used for chronic toxicity testing. The accelerated monitoring trigger levels are consistent with the previous permit and Table 4-5 of the Basin Plan.

7. Antidegradation

NPDES regulations at 40 CFR 131.12 require that State water quality standards include an antidegradation policy consistent with federal policy. The State Water Board established California's antidegradation policy through State Water Board Resolution 68-16, which incorporates federal policy where federal policy applies. Resolution 68-16 requires that existing water quality be maintained unless degradation is justified based on specific findings. The Basin Plan implements, and incorporates by reference, both State and federal antidegradation policies.

The permitted discharge is consistent with the antidegradation provisions of 40 CFR 131.12 and State Water Board Resolution 68-16. With the exception of the copper limits (discussed below), this Order continues the status quo with respect to the level of discharge authorized in the previous permit and thus there will be no change in water quality beyond the level authorized in the last permit. The limitations in this Order comply with antidegradation requirements because they hold the Discharger to performance levels that will neither cause nor contribute to water quality impairment, nor further water quality degradation. This is because this Order does not provide for an increase in the permitted design flow, allow for a reduced level of treatment, or increase effluent limitations (with the exception of copper).

The copper limits in this Order are less stringent than those in the previous permit because they were calculated based on site-specific objectives. CWA section 303(d)(4)(B) allows effluent limits to be revised for water bodies that meet water quality standards if such revisions are consistent with antidegradation policies. In this case, the receiving water (San Francisco Bay) is in attainment with existing copper water quality objectives. The backsliding is consistent with antidegradation policies for the reasons set forth below:

- The water quality baseline for purposes of evaluating the potential for degradation is the water quality resulting from compliance with the previous permit, which was adopted in accordance with antidegradation policies. This quality is represented by recent RMP data collected at the Yerba Buena station, located in Central San Francisco Bay, reasonably close to the discharge location.

- Most other dischargers throughout the San Francisco Bay Region have obtained permits with less stringent copper limits based on the site-specific objectives, and have implemented Copper Action Plans as the Basin Plan requires. During this time, copper concentrations at the Yerba Buena station have remained stable. From January 2000 through December 2010, total copper ranged from 0.72 to 2.5 μg/L and averaged 1.6 μg/L.

- Despite the higher copper limits, there would be no increase in influent copper concentrations and no reduction in treatment effectiveness. The Order allows no relaxation of copper source control or pollution prevention efforts. Likewise, the treatment process employed at the Plant would remain unchanged. The Discharger has neither an incentive nor the capability to modify the Plant's physical or biological treatment processes to increase effluent copper concentrations without risking violations of other permit limitations and provisions.

- To further ensure that effluent copper concentrations could not increase, the Order requires implementation of a Copper Action Plan (Provision VI.C.5.b), as mandated by the Basin Plan. To ensure the Copper Action Plan's effectiveness, it includes a three-year average copper concentration trigger, which, if exceeded, requires additional implementation measures to ensure that effluent copper concentrations do not increase.

Because no increase in copper effluent concentrations is expected, there will be no lowering of water quality beyond the current level authorized in the previous permit, which is the baseline by which to measure whether degradation will occur. Therefore, findings authorizing degradation are unnecessary. The discharge is consistent with 40 CFR 131.12 and State Water Board Resolution No. 68-16.

This Order does not retain the mercury effluent limit in the previous permit because mercury discharges to San Francisco Bay are now regulated by Regional Water Board Order No. R2-2007-0077, which is a watershed permit that implements the San Francisco Bay Mercury TMDL. Order No. R2-2007-0077 complied with anti-backsliding and antidegradation requirements.

V. RATIONALE FOR RECEIVING WATER LIMITATIONS

Receiving water limitations V.A.1 and V.A.2 are based on the narrative and numeric objectives contained in Basin Plan Chapter 3. Receiving water limitation V.A.3 is retained from the previous permit and requires compliance with federal and State water quality standards.

VI. RATIONALE FOR MONITORING AND REPORTING REQUIREMENTS

The MRP is a standard requirement in almost all NPDES permits issued by the Regional Water Board, including this Order. It contains definitions of terms and sets out requirements for reporting routine monitoring data in accordance with NPDES regulations, the CWC, and State and Regional Water Board policies. The MRP also defines the sampling stations and frequency, the pollutants to be monitored, and additional reporting requirements. Pollutants to be monitored include all parameters for which effluent limitations are specified. Monitoring for additional constituents, for which no effluent limitations are established, is also required to provide data for future completion of RPAs.

The following provides the rationale for the monitoring and reporting requirements contained in the MRP for this facility:

A. Influent Monitoring

Influent monitoring requirements at INF-001 for $CBOD_5$ and TSS are unchanged from the previous permit to allow determination of compliance with this Order's 85% removal requirement. Flow monitoring is also retained to evaluate compliance with Prohibition III.D (average dry weather flow). Influent cyanide monitoring required for the pretreatment program satisfies the Basin Plan requirement for influent monitoring in this Order.

B. Effluent Monitoring

The MRP retains most effluent monitoring requirements at Monitoring Location EFF-001 from the previous permit. Changes in effluent monitoring are summarized as follows:

- A new monitoring location (EFF-001b) was established to monitor effluent discharges during blending events. During blending events, additional monitoring at EFF-001b will be required consistent with Attachment G, section III.A.3.b.6.

- Monitoring for ammonia nitrogen has been clarified to specify total ammonia, consistent with the ammonia effluent limitations.

- Monitoring for mercury has been removed; mercury is now covered under Order No. R2-2007-0077.

- Monitoring for enterococcus bacteria has been established to determine compliance with new effluent limitations. Basin Plan Table 4-2A, footnote a, specifies that the enterococcus limit, "shall be implemented as a geometric mean of a minimum of 5 effluent samples spaced over a calendar month." It further states that fewer samples may be used on a case-by-case basis. If after three months the Discharger has demonstrated full compliance with the enterococcus effluent limitation, the MRP allows the Discharger to reduce its enterococcus monitoring frequency to twice per year.

- Monitoring for the remaining priority pollutants is still required under the Effluent Characterization Study specified in section VI.C.2.a of the Order.

C. Whole Effluent Toxicity Testing Requirements

1. **Acute Toxicity.** Monthly 96-hour bioassay testing is required to demonstrate compliance with the effluent limitation for acute toxicity. The MRP requires the use the rainbow trout as the bioassay test species.

2. **Chronic Toxicity.** This Order establishes a requirement for the Discharger to conduct chronic toxicity testing twice a year to ensure the discharge has acceptable levels of chronic toxicity. The Discharger conducted an effluent toxicity screening study during the previous permit term. The study concluded that the *Americamysis bahia* (mysid shrimp) was the most sensitive species. The permit, therefore, requires the use of *Americamysis bahia* as the chronic toxicity test species. The Discharger is to re-screen in accordance with MRP Appendix E-1 (Attachment E) after any significant change in the nature of the effluent or prior to submittal of the application for permit reissuance, due January 31, 2017.

D. Receiving Water Monitoring

The Discharger is required to continue participating in the San Francisco Estuary Institute's Regional Monitoring Program (RMP), which involves collection of data on pollutants and toxicity in San Francisco Bay water, sediment, and biota. The Discharger's participation and support of the RMP is the basis for not including other receiving water monitoring requirements in this permit.

E. Pretreatment and Biosolids Monitoring

The pretreatment monitoring requirements for influent, effluent, and biosolids are retained from the previous permit and are required to assess compliance with the Discharger's USEPA-approved pretreatment program. Biosolids monitoring is required pursuant to 40 CFR Part 503.

This Order specifies the sampling type for pretreatment monitoring. Specifically, it requires grab samples for VOCs, BNA, cyanide, and hexavalent chromium. Discrete grabs are necessary for these parameters to minimize potential losses during automatic compositing. VOCs are volatile, and cyanide and BNAs are also somewhat volatile. Hexavalent chromium is chemically unstable.

VII. RATIONALE FOR PROVISIONS

A. Standard Provisions (Provision VI.A)

Standard Provisions, which in accordance with 40 CFR 122.41and 122.42 apply to all NPDES discharges and must be included in every NPDES permit, are provided in Attachments D. NPDES regulations at 40 CFR 122.41(a)(1) and (b) through (n) establish conditions that apply to all state-issued NPDES permits. These conditions must be incorporated into the permits either expressly or by reference. NPDES regulations at 40 CFR 123.25(a)(12) allow the state to omit or modify conditions to impose more stringent requirements. The Regional Standard Provisions (Attachment G) supplement the Federal Standard Provisions. In accordance with 40 CFR 123.25, this Order omits federal conditions that address enforcement authority specified in 40 CFR 122.41(j)(5) and (k)(2) because the CWC enforcement authority is more stringent. In lieu of these conditions, this Order incorporates by reference CWC section 13387(e).

B. MRP Requirements (Provision VI.B)

The Discharger is required to monitor the permitted discharges in order to evaluate compliance with permit conditions. Monitoring requirements are contained in the MRP (Attachment E), Standard Provisions (Attachment D), and the Regional Standard Provisions (Attachment G). This provision requires compliance with these documents and is authorized by 40 CFR 122.41(h) and (j), and CWC sections 13267 and 13383.

The table below summarizes routine monitoring requirements. This table is for informational purposes only. Actual requirements are specified in the MRP and other applicable provisions of this Order.

Table F-9. Monitoring Requirements Summary

Parameter	Influent INF-001	Effluent EFF-001	Effluent EFF-002 (EFF-001 after dechlorination)	Effluent EFF-002b (during blending)	Sludge and Biosolids B-001	Receiving Water
Flow		Continuous		Continuous		
CBOD	1/Week		1/Week	1/Year		
TSS	1/Week		3/Week	1/Day		
Oil and Grease			1/Quarter			
pH			1/Day or Continuous	1/Day or Continuous		Support RMP
Chlorine Residual			Continuous	Continuous		
Acute Toxicity			1/Month			Support RMP
Chronic Toxicity			2/Year			Support RMP
Total Coliform		3/Week		1/Day		Support RMP
Enterococcus		4/Year		1/Day		Support RMP
Temperature			1/Day	1/Year		Support RMP
Copper			1/Month	1/Year		Support RMP
Cyanide	1/Month		1/Month	1/Year	2/Year	Support RMP
Ammonia			1/Month	1/Year		Support RMP
Dioxin-TEQ			2/Year			Support RMP
VOCs	2/Year		2/Year		2/Year	Support RMP
BNA	1/Year		1/Year		2/Year	Support RMP
Metals, including Hexavalent Chromium and Mercury	1/Month		1/Month		2/Year	Support RMP
All Other Priority Pollutants			1/Year			Support RMP
Standard Observations		1/Month				

Metric tons/year					See Att. G § III.B.1	
Paint filter test					See Att. G § III.B.2	

The principal purposes of a monitoring program are to:

- Document compliance with waste discharge requirements and prohibitions established by the Regional Water Board,
- Facilitate self-policing by the Discharger in the prevention and abatement of pollution arising from waste discharge, and
- Develop or assist in the development of limitations, discharge prohibitions, national standards of performance, pretreatment and toxicity standards, and other standards, and Prepare water and wastewater quality inventories.

C. Special Provisions (Provision VI.C)

1. Reopener Provisions

These provisions are based on 40 CFR 122.63 and allow modification of this Order and its effluent limitations as necessary in response to updated water quality standards, regulations, or other new relevant information that may become available in the future and other circumstances allowed by law.

2. Effluent Characterization Study and Report

This Order does not include effluent limitations for priority pollutants that do not demonstrate reasonable potential, but this provision requires the Discharger to continue monitoring for these pollutants as described in the Regional Standard Provisions (Attachment G) and as specified in the MRP (Attachment E). This requirement is authorized pursuant to CWC section 13267, and is necessary to inform the next permit reissuance and to ensure that the Discharger takes proper and timely steps in response to any changes in unanticipated effluent quality during the term of this Order.

3. Best Management Practices and Pollutant Minimization Program

This provision for a Pollutant Minimization Program is based on Basin Plan Chapter 4 (section 4.13.2) and SIP Chapter 2 (section 2.4.5).

4. Special Provisions for POTWs

a. **Pretreatment Program.** This provision is based on 40 CFR 403 (General Pretreatment Regulations for Existing and New Sources of Pollution) and is retained from the previous permit. The Discharger implements a pretreatment program due to the nature and volume of industrial influent to the Plant.

b. **Biosolids Management Practices.** This provision is based on Basin Plan Chapter 4, section 4.17, and 40 CFR Parts 257 and 503, and is retained from the previous permit.

c. **Sanitary Sewer Overflows and Sewer System Management Plan.** This provision is to explain the Order's requirements as they relate to the Discharger's collection system and to promote consistency with the State Water Board-adopted General Collection System WDRs (General Order, Order No. 2006-0003-DWQ). The General Order requires public agencies that own or operate sanitary sewer systems with greater than one mile of pipes or sewer lines to enroll for coverage under the General Order. The General Order requires agencies to develop sanitary sewer management plans and report all sanitary sewer overflows, among other requirements and prohibitions. Furthermore, the General Order contains requirements for operation and maintenance of collection systems and for reporting and mitigating sanitary sewer overflows. The public agencies that are discharging wastewater into the Facility were required to enroll under the General Order.

The Discharger owns and operates less than one mile of force mains so it is not subject to the General Order. Because the Discharger's force mains are part of the Facility subject to this Order, certain standard provisions apply as specified in Provisions, section VII.C.4. These provisions serve the same functions as those of the General Order.

5. Other Special Provisions

a. **Specific Tasks to Reduce Blending.** This provision is based on 40 CFR 122.41(m) and USEPA's proposed *Peak Wet Weather Policy* (December 2005). The previous permit required the Discharger to submit a No Feasible Alternatives Analysis. Table 8 of the Order is based on the No Feasible Alternatives Analysis, dated March 30, 2011, and requires the Discharger to take actions that are feasible to accomplish within this permit term to reduce or eliminate blending.

The tasks include a requirement to submit a No Feasible Alternatives Analysis with the application for permit reissuance. USEPA's proposed *Wet Weather Policy* sets forth a set of requirements and specific analyses for the Discharger to complete in order to determine whether its peak wet weather flow blending discharge should be considered a bypass under 40 CFR 122.41(m) and whether any feasible alternatives to blending are available to the Discharger. These analyses are intended to address the criteria designating bypass status at 40 CFR 122.41(m)(4)(i)(A)-(C). The Regional Water Board will use the "No Feasible Alternatives Analysis" to review and approve or deny the peak wet weather diversions based on the determination of whether there are feasible alternatives to those diversions. If these criteria are met and no feasible alternative exists, the Regional Water Board may approve peak wet weather flow diversions around secondary treatment units in an NPDES permit for discharges from a municipal treatment plant as an anticipated bypass under 40 CFR 122.41(m)(4)(ii).

b. **Copper Action Plan.** This provision is based on Basin Plan section 7.2.1.2. It is necessary to ensure that use of copper site-specific objectives is consistent with antidegradation policies. Data from the San Francisco Estuary Institute compiled for 2008-2010 indicate no degradation of San Francisco Bay water quality with respect to copper (http://www.sfei.org/content/copper-site-specific-objective-3-year-rolling-averages).

c. **Cyanide Action Plan.** This provision is based on Basin Plan section 4.7.2.2. It is necessary to ensure that use of cyanide site-specific objectives is consistent with antidegradation policies. The threshold for considering influent cyanide concentrations to indicate a possible "significant cyanide discharge" in the Discharger's service area is set at 10 µg/L. This concentration is twice the cyanide ML set forth in the SIP. Because the Discharger has not observed influent cyanide concentrations above the ML, if influent concentrations twice this concentration were observed, there could be a significant cyanide source.

d. **Fats, Oils, and Grease.** The Discharger is currently undertaking construction of a new fats, oil, and grease and food waste receiving station to be completed by the end of 2013. This provision is intended to avoid duplicate regulation by eliminating the need for the California Department of Resources Recycling and Recovery (CalRecycle) to require a permit for injecting fats, oils, and grease, or food processing wastes into the anaerobic digesters. CalRecycle may choose not to require a separate permit if it deems the requirements of this Order to serve essentially the same purpose.

VIII. PUBLIC PARTICIPATION

The Regional Water Board is considering the issuance of WDRs that will serve as an NPDES permit for the Facility. As a step in the WDRs adoption process, Regional Water Board staff has developed tentative WDRs. The Regional Water Board encourages public participation in the WDR adoption process.

A. Notification of Interested Parties

The Regional Water Board has notified the Discharger and interested agencies and persons of its intent to prescribe WDRs for the discharge and has provided them with an opportunity to submit written comments and recommendations. Notification was provided through the Marin Independent Journal.

B. Written Comments

Staff determinations are tentative. Interested persons are invited to submit written comments concerning these tentative WDRs. Comments must be submitted either in person or by mail to the Executive Officer at the Regional Water Board at 1515 Clay Street, Suite 1400, Oakland, CA 94612, to the attention of Vince Christian.

To receive full consideration and a written response, written comments must be received at the Regional Water Board offices by 5:00 p.m. on March 26, 2012.

C. Public Hearing

The Regional Water Board will hold a public hearing on the tentative WDRs during its regular meeting at the following date and time, and at the following location:

Date: June 13, 2012
Time: 9:00 am
Location: Elihu Harris State Office Building
1515 Clay Street, 1st Floor Auditorium
Oakland, CA 94612

Contact: Vince Christian, (510) 622-2336, email VChristian@waterboards.ca.gov

Interested persons are invited to attend. At the public hearing, the Regional Water Board will hear testimony, if any, pertinent to the discharge, WDRs, and permit. Oral testimony will be heard; however, for accuracy of the record, important testimony should be in writing.

Dates and venues may change. The Regional Water Board web address is http://www.waterboards.ca.gov/sanfranciscobay, where one can access the current agenda for changes in dates and locations.

D. Waste Discharge Requirements Petitions

Any aggrieved person may petition the State Water Board to review the decision of the Regional Water Board regarding the final WDRs. The petition must be submitted within 30 days of the Regional Water Board's action to the following address:

State Water Resources Control Board
Office of Chief Counsel
P.O. Box 100, 1001 I Street
Sacramento, CA 95812-0100

E. Information and Copying

The Report of Waste Discharge related documents, tentative effluent limitations, and special provisions, comments received, and other information are on file and may be inspected at the address above at any time between 9:00 a.m. and 5:00 p.m., Monday through Friday. Copying of documents may be arranged by calling 510-622-2300.

F. Register of Interested Persons

Any person interested in being placed on the mailing list for information regarding the WDRs and NPDES permit should contact the Regional Water Board, reference this facility, and provide a name, address, and phone number.

G. Additional Information

Requests for additional information or questions regarding this order should be directed to Vince Christian at 510-622-2336 or e-mail at VChristian@waterboards.ca.gov.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT G
REGIONAL STANDARD PROVISIONS, AND MONITORING
AND REPORTING REQUIREMENTS
(SUPPLEMENT TO ATTACHMENT D)

For

NPDES WASTEWATER DISCHARGE PERMITS

March 2010

Table of Contents

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

REGIONAL STANDARD PROVISIONS, AND MONITORING AND REPORTING REQUIREMENTS (SUPPLEMENT TO ATTACHMENT D)

FOR

NPDES WASTEWATER DISCHARGE PERMITS

APPLICABILITY

This document applies to dischargers covered by a National Pollutant Discharge Elimination System (NPDES) permit. This document does not apply to Municipal Separate Storm Sewer System (MS4) NPDES permits.

The purpose of this document is to supplement the requirements of Attachment D, Standard Provisions. The requirements in this supplemental document are designed to ensure permit compliance through preventative planning, monitoring, recordkeeping, and reporting. In addition, this document requires proper characterization of issues as they arise, and timely and full responses to problems encountered. To provide clarity on which sections of Attachment D this document supplements, this document is arranged in the same format as Attachment D.

I. STANDARD PROVISIONS - PERMIT COMPLIANCE

A. Duty to Comply – Not Supplemented

B. Need to Halt or Reduce Activity Not a Defense – Not Supplemented

C. Duty to Mitigate – This supplements I.C. of Standard Provisions (Attachment D)

1. **Contingency Plan** - The Discharger shall maintain a Contingency Plan as originally required by Regional Water Board Resolution 74-10 and as prudent in accordance with current municipal facility emergency planning. The Contingency Plan shall describe procedures to ensure that existing facilities remain in, or are rapidly returned to, operation in the event of a process failure or emergency incident, such as employee strike, strike by suppliers of chemicals or maintenance services, power outage, vandalism, earthquake, or fire. The Discharger may combine the Contingency Plan and Spill Prevention Plan into one document. Discharge in violation of the permit where the Discharger has failed to develop and implement a Contingency Plan as described below will be the basis for considering the discharge a willful and negligent violation of the permit pursuant to California Water Code Section 13387. The Contingency Plan shall, at a minimum, contain the provisions of a. through g. below.

    a. Provision of personnel for continued operation and maintenance of sewerage facilities during employee strikes or strikes against contractors providing services.

b. Maintenance of adequate chemicals or other supplies and spare parts necessary for continued operations of sewerage facilities.

c. Provisions of emergency standby power.

d. Protection against vandalism.

e. Expeditious action to repair failures of, or damage to, equipment and sewer lines.

f. Report of spills and discharges of untreated or inadequately treated wastes, including measures taken to clean up the effects of such discharges.

g. Programs for maintenance, replacement, and surveillance of physical condition of equipment, facilities, and sewer lines.

2. **Spill Prevention Plan** - The Discharger shall maintain a Spill Prevention Plan to prevent accidental discharges and minimize the effects of such events. The Spill Prevention Plan shall:

a. Identify the possible sources of accidental discharge, untreated or partially treated waste bypass, and polluted drainage;

b. Evaluate the effectiveness of present facilities and procedures, and state when they became operational; and

c. Predict the effectiveness of the proposed facilities and procedures, and provide an implementation schedule containing interim and final dates when they will be constructed, implemented, or operational.

This Regional Water Board, after review of the Contingency and Spill Prevention Plans or their updated revisions, may establish conditions it deems necessary to control accidental discharges and to minimize the effects of such events. Such conditions may be incorporated as part of the permit upon notice to the Discharger.

D. Proper Operation & Maintenance – This supplements I.D of Standard Provisions (Attachment D)

1. **Operation and Maintenance (O&M) Manual** - The Discharger shall maintain an O&M Manual to provide the plant and regulatory personnel with a source of information describing all equipment, recommended operational strategies, process control monitoring, and maintenance activities. To remain a useful and relevant document, the O&M Manual shall be kept updated to reflect significant changes in treatment facility equipment and operational practices. The O&M Manual shall be maintained in usable condition and be available for reference and use by all relevant personnel and Regional Water Board staff.

2. **Wastewater Facilities Status Report** - The Discharger shall regularly review, revise, or update, as necessary, its Wastewater Facilities Status Report. This report shall document how the Discharger operates and maintains its wastewater collection, treatment, and disposal facilities to ensure that all facilities are adequately staffed, supervised, financed, operated,

maintained, repaired, and upgraded as necessary to provide adequate and reliable transport, treatment, and disposal of all wastewater from both existing and planned future wastewater sources under the Discharger's service responsibilities.

3. **Proper Supervision and Operation of Publicly Owned Treatment Works (POTWs) -** POTWs shall be supervised and operated by persons possessing certificates of appropriate grade pursuant to Division 4, Chapter 14, Title 23 of the California Code of Regulations.

E. Property Rights – Not Supplemented

F. Inspection and Entry – Not Supplemented

G. Bypass – Not Supplemented

H. Upset – Not Supplemented

I. Other – This section is an addition to Standard Provisions (Attachment D)

1. Neither the treatment nor the discharge of pollutants shall create pollution, contamination, or nuisance as defined by California Water Code Section 13050.

2. Collection, treatment, storage, and disposal systems shall be operated in a manner that precludes public contact with wastewater, except in cases where excluding the public is infeasible, such as private property. If public contact with wastewater could reasonably occur on public property, warning signs shall be posted.

3. If the Discharger submits a timely and complete Report of Waste Discharge for permit reissuance, this permit continues in force and effect until a new permit is issued or the Regional Water Board rescinds the permit.

J. Storm Water – This section is an addition to Standard Provisions (Attachment D)

These provisions apply to facilities that do not direct all storm water flows from the facility to the wastewater treatment plant headworks.

1. Storm Water Pollution Prevention Plan (SWPP Plan)

The SWPP Plan shall be designed in accordance with good engineering practices and shall address the following objectives:

a. To identify pollutant sources that may affect the quality of storm water discharges; and

b. To identify, assign, and implement control measures and management practices to reduce pollutants in storm water discharges.

The SWPP Plan may be combined with the existing Spill Prevention Plan as required in accordance with Section C.2. The SWPP Plan shall be retained on-site and made available upon request of a representative of the Regional Water Board.

2. Source Identification

The SWPP Plan shall provide a description of potential sources that may be expected to add significant quantities of pollutants to storm water discharges, or may result in non-storm water discharges from the facility. The SWPP Plan shall include, at a minimum, the following items:

a. A topographical map (or other acceptable map if a topographical map is unavailable), extending one-quarter mile beyond the property boundaries of the facility, showing the wastewater treatment facility process areas, surface water bodies (including springs and wells), and discharge point(s) where the facility's storm water discharges to a municipal storm drain system or other points of discharge to waters of the State. The requirements of this paragraph may be included in the site map required under the following paragraph if appropriate.

b. A site map showing the following:

   1) Storm water conveyance, drainage, and discharge structures;

   2) An outline of the storm water drainage areas for each storm water discharge point;

   3) Paved areas and buildings;

   4) Areas of actual or potential pollutant contact with storm water or release to storm water, including but not limited to outdoor storage and process areas; material loading, unloading, and access areas; and waste treatment, storage, and disposal areas;

   5) Location of existing storm water structural control measures (i.e., berms, coverings, etc.);

   6) Surface water locations, including springs and wetlands; and

   7) Vehicle service areas.

c. A narrative description of the following:

   1) Wastewater treatment process activity areas;

   2) Materials, equipment, and vehicle management practices employed to minimize contact of significant materials of concern with storm water discharges;

   3) Material storage, loading, unloading, and access areas;

   4) Existing structural and non-structural control measures (if any) to reduce pollutants in storm water discharges; and

   5) Methods of on-site storage and disposal of significant materials.

d. A list of pollutants that have a reasonable potential to be present in storm water discharges in significant quantities.

3. Storm Water Management Controls

The SWPP Plan shall describe the storm water management controls appropriate for the facility and a time schedule for fully implementing such controls. The appropriateness and priorities of controls in the SWPP Plan shall reflect identified potential sources of pollutants. The description of storm water management controls to be implemented shall include, as appropriate:

a. Storm water pollution prevention personnel

Identify specific individuals (and job titles) that are responsible for developing, implementing, and reviewing the SWPP Plan.

b. Good housekeeping

Good housekeeping requires the maintenance of clean, orderly facility areas that discharge storm water. Material handling areas shall be inspected and cleaned to reduce the potential for pollutants to enter the storm drain conveyance system.

c. Spill prevention and response

Identify areas where significant materials can spill into or otherwise enter storm water conveyance systems and their accompanying drainage points. Specific material handling procedures, storage requirements, and cleanup equipment and procedures shall be identified, as appropriate. The necessary equipment to implement a cleanup shall be available, and personnel shall be trained in proper response, containment, and cleanup of spills. Internal reporting procedures for spills of significant materials shall be established.

d. Source control

Source controls include, for example, elimination or reduction of the use of toxic pollutants, covering of pollutant source areas, sweeping of paved areas, containment of potential pollutants, labeling of all storm drain inlets with “No Dumping” signs, isolation or separation of industrial and non-industrial pollutant sources so that runoff from these areas does not mix, etc.

e. Storm water management practices

Storm water management practices are practices other than those that control the sources of pollutants. Such practices include treatment or conveyance structures, such as drop inlets, channels, retention and detention basins, treatment vaults, infiltration galleries, filters, oil/water separators, etc. Based on assessment of the potential of various sources to contribute pollutants to storm water discharges in significant quantities, additional storm water management practices to remove pollutants from storm water discharges shall be implemented and design criteria shall be described.

f. Sediment and erosion control

Measures to minimize erosion around the storm water drainage and discharge points, such as riprap, revegetation, slope stabilization, etc., shall be described.

g. Employee training

Employee training programs shall inform all personnel responsible for implementing the SWPP Plan. Training shall address spill response, good housekeeping, and material management practices. New employee and refresher training schedules shall be identified.

h. Inspections

All inspections shall be done by trained personnel. Material handling areas shall be inspected for evidence of, or the potential for, pollutants entering storm water discharges. A tracking or follow up procedure shall be used to ensure appropriate response has been taken in response to an inspection. Inspections and maintenance activities shall be documented and recorded. Inspection records shall be retained for five years.

i. Records

A tracking and follow-up procedure shall be described to ensure that adequate response and corrective actions have been taken in response to inspections.

4. Annual Verification of SWPP Plan

An annual facility inspection shall be conducted to verify that all elements of the SWPP Plan are accurate and up-to-date. The results of this review shall be reported in the Annual Report to the Regional Water Board described in Section V.C.f.

K. Biosolids Management – This section is an addition to Standard Provisions (Attachment D)

Biosolids must meet the following requirements prior to land application. The Discharger must either demonstrate compliance or, if it sends the biosolids to another party for further treatment or distribution, must give the recipient the information necessary to ensure compliance.

1. Exceptional quality biosolids meet the pollutant concentration limits in Table III of 40 CFR Part 503.13, Class A pathogen limits, and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8). Such biosolids do not have to be tracked further for compliance with general requirements (503.12) and management practices (503.14).

2. Biosolids used for agricultural land, forest, or reclamation shall meet the pollutant limits in Table I (ceiling concentrations) and Table II or Table III (cumulative loadings or pollutant concentration limits) of 503.13. They shall also meet the general requirements (503.12) and management practices (503.14) (if not exceptional quality biosolids) for Class A or Class B pathogen levels with associated access restrictions (503.32) and one of the 10 vector attraction reduction requirements in 503.33(b)(1)-(b)(10).

3. Biosolids used for lawn or home gardens must meet exceptional quality biosolids limits.

4. Biosolids sold or given away in a bag or other container must meet the pollutant limits in either Table III or Table IV (pollutant concentration limits or annual pollutant loading rate limits) of 503.13. If Table IV is used, a label or information sheet must be attached to the biosolids packing that explains Table IV (see 503.14). The biosolids must also meet the Class

A pathogen limits and one of the vector attraction reduction requirements in 503.33(b)(1)-(b)(8).

II. STANDARD PROVISIONS – PERMIT ACTION – Not Supplemented

III. STANDARD PROVISIONS – MONITORING

A. Sampling and Analyses – This section is a supplement to III.A and III.B of Standard Provisions (Attachment D)

1. Use of Certified Laboratories

Water and waste analyses shall be performed by a laboratory certified for these analyses in accordance with California Water Code Section 13176.

2. Use of Appropriate Minimum Levels

Table C lists the suggested analytical methods for the 126 priority pollutants and other toxic pollutants that should be used, unless a particular method or minimum level (ML) is required in the MRP.

For priority pollutant monitoring, when there is more than one ML value for a given substance, the Discharger may select any one of the analytical methods cited in Table C for compliance determination, or any other method described in 40 CFR part 136 or approved by USEPA (such as the 1600 series) if authorized by the Regional Water Board. However, the ML must be below the effluent limitation and water quality objective. If no ML value is below the effluent limitation and water quality objective, then the method must achieve an ML no greater than the lowest ML value indicated in Table C. All monitoring instruments and equipment shall be properly calibrated and maintained to ensure accuracy of measurements.

3. Frequency of Monitoring

The minimum schedule of sampling analysis is specified in the MRP portion of the permit.

a. Timing of Sample Collection

1) The Discharger shall collect samples of influent on varying days selected at random and shall not include any plant recirculation or other sidestream wastes, unless otherwise stipulated by the MRP.

2) The Discharger shall collect samples of effluent on days coincident with influent sampling unless otherwise stipulated by the MRP or the Executive Officer. The Executive Officer may approve an alternative sampling plan if it is demonstrated to be representative of plant discharge flow and in compliance with all other permit requirements.

3) The Discharger shall collect grab samples of effluent during periods of day-time maximum peak effluent flows (or peak flows through secondary treatment units for facilities that recycle effluent flows).

4) Effluent sampling for conventional pollutants shall occur on at least one day of any multiple-day bioassay test the MRP requires. During the course of the test, on at least one day, the Discharger shall collect and retain samples of the discharge. In the event a bioassay test does not comply with permit limits, the Discharger shall analyze these retained samples for pollutants that could be toxic to aquatic life and for which it has effluent limits.

   i. The Discharger shall perform bioassay tests on final effluent samples; when chlorine is used for disinfection, bioassay tests shall be performed on effluent after chlorination-dechlorination; and

   ii. The Discharger shall analyze for total ammonia nitrogen and calculate the amount of un-ionized ammonia whenever test results fail to meet the percent survival specified in the permit.

b. Conditions Triggering Accelerated Monitoring

1) If the results from two consecutive samples of a constituent monitored in a 30-day period exceed the monthly average limit for any parameter (or if the required sampling frequency is once per month and the monthly sample exceeds the monthly average limit), the Discharger shall, within 24 hours after the results are received, increase its sampling frequency to daily until the results from the additional sampling show that the parameter is in compliance with the monthly average limit.

2) If any maximum daily limit is exceeded, the Discharger shall increase its sampling frequency to daily within 24 hours after the results are received that indicate the exceedance of the maximum daily limit until two samples collected on consecutive days show compliance with the maximum daily limit.

3) If final or intermediate results of an acute bioassay test indicate a violation or threatened violation (e.g., the percentage of surviving test organisms of any single acute bioassay test is less than 70 percent), the Discharger shall initiate a new test as soon as practical, and the Discharger shall investigate the cause of the mortalities and report its findings in the next self monitoring report (SMR).

4) The Discharger shall calibrate chlorine residual analyzers against grab samples as frequently as necessary to maintain accurate control and reliable operation. If an effluent violation is detected, the Discharger shall collect grab samples at least every 30 minutes until compliance with the limit is achieved, unless the Discharger monitors chlorine residual continuously. In such cases, the Discharger shall continue to conduct continuous monitoring as required by its permit.

5) When a bypass occurs (except one subject to provision III.A.3.b.6 below), the Discharger shall monitor flows and collect samples on a daily basis for all constituents at affected discharge points that have effluent limits for the duration of the bypass (including acute toxicity using static renewals), except chronic toxicity, unless otherwise stipulated by the MRP.

6) Unless otherwise stipulated by the MRP, when a bypass approved pursuant to Attachment D, Standard Provisions, Sections I.G.2 or I.G.4, occurs, the Discharger

shall monitor flows and, using appropriate procedures as specified in the MRP, collect and retain samples for affected discharge points on a daily basis for the duration of the bypass. The Discharger shall analyze for total suspended solids (TSS) using 24-hour composites (or more frequent increments) and for bacteria indicators with effluent limits using grab samples. If TSS exceeds 45 mg/L in any composite sample, the Discharger shall also analyze the retained samples for that discharge for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. Additionally, at least once each year, the Discharger shall analyze the retained samples for one approved bypass discharge event for all other constituents that have effluent limits, except oil and grease, mercury, dioxin-TEQ, and acute and chronic toxicity. This monitoring shall be in addition to the minimum monitoring specified in the MRP.

c. Storm Water Monitoring

The requirements of this section only apply to facilities that are not covered by an NPDES permit for storm water discharges and where not all site storm drainage from process areas (i.e., areas of the treatment facility where chemicals or wastewater could come in contact with storm water) is directed to the headworks. For storm water not directed to the headworks during the wet season (October 1 to April 30), the Discharger shall:

1) Conduct visual observations of the storm water discharge locations during daylight hours at least once per month during a storm event that produces significant storm water discharge to observe the presence of floating and suspended materials, oil and grease, discoloration, turbidity, and odor, etc.

2) Measure (or estimate) the total volume of storm water discharge, collect grab samples of storm water discharge from at least two storm events that produce significant storm water discharge, and analyze the samples for oil and grease, pH, TSS, and specific conductance.

   The grab samples shall be taken during the first 30 minutes of the discharge. If collection of the grab samples during the first 30 minutes is impracticable, grab samples may be taken during the first hour of the discharge, and the Discharger shall explain in the Annual Report why the grab sample(s) could not be taken in the first 30 minutes.

3) Testing for the presence of non-storm water discharges shall be conducted no less than twice during the dry season (May 1 to September 30) at all storm water discharge locations. Tests may include visual observations of flows, stains, sludges, odors, and other abnormal conditions; dye tests; TV line surveys; or analysis and validation of accurate piping schematics. Records shall be maintained describing the method used, date of testing, locations observed, and test results.

4) Samples shall be collected from all locations where storm water is discharged. Samples shall represent the quality and quantity of storm water discharged from the facility. If a facility discharges storm water at multiple locations, the Discharger may sample a reduced number of locations if it establishes and documents through the monitoring program that storm water discharges from different locations are substantially identical.

5) Records of all storm water monitoring information and copies of all reports required by the permit shall be retained for a period of at least three years from the date of sample, observation, or report.

d. Receiving Water Monitoring

The requirements of this section only apply when the MRP requires receiving water sampling.

1) Receiving water samples shall be collected on days coincident with effluent sampling for conventional pollutants.

2) Receiving water samples shall be collected at each station on each sampling day during the period within one hour following low slack water. Where sampling during lower slack water is impractical, sampling shall be performed during higher slack water. Samples shall be collected within the discharge plume and down current of the discharge point so as to be representative, unless otherwise stipulated in the MRP.

3) Samples shall be collected within one foot of the surface of the receiving water, unless otherwise stipulated in the MRP.

B. Biosolids Monitoring – This section supplements III.B of Standard Provisions (Attachment D)

When biosolids are sent to a landfill, sent to a surface disposal site, or applied to land as a soil amendment, they must be monitored as follows:

1. Biosolids Monitoring Frequency

Biosolids disposal must be monitored at the following frequency:

Metric tons biosolids/365 days	Frequency
0-290	Once per year
290-1500	Quarterly
1500-15,000	Six times per year
Over 15,000	Once per month

(Metric tons are on a dry weight basis)

2. Biosolids Pollutants to Monitor

Biosolids shall be monitored for the following constituents:

Land Application: arsenic, cadmium, copper, mercury, molybdenum, nickel, lead, selenium, and zinc

Municipal Landfill: Paint filter test (pursuant to 40 CFR 258)

Biosolids-only Landfill or Surface Disposal Site (if no liner and leachate system): arsenic, chromium, and nickel

C. Standard Observations – This section is an addition to III of Standard Provisions (Attachment D)

1. Receiving Water Observations

The requirements of this section only apply when the MRP requires standard observations of the receiving water. Standard observations shall include the following:

a. *Floating and suspended materials* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence, source, and size of affected area.

b. *Discoloration and turbidity*: description of color, source, and size of affected area.

c. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

d. *Beneficial water use*: presence of water-associated waterfowl or wildlife, fisherpeople, and other recreational activities in the vicinity of each sampling station.

e. *Hydrographic condition*: time and height of corrected high and low tides (corrected to nearest National Oceanic and Atmospheric Administration location for the sampling date and time of sample collection).

f. *Weather conditions*:

1) Air temperature; and

2) Total precipitation during the five days prior to observation.

2. Wastewater Effluent Observations

The requirements of this section only apply when the MRP requires wastewater effluent standard observations. Standard observations shall include the following:

a. *Floating and suspended material of wastewater origin* (e.g., oil, grease, algae, and other macroscopic particulate matter): presence or absence.

b. *Odor*: presence or absence, characterization, source, distance of travel, and wind direction.

3. Beach and Shoreline Observations

The requirements of this section only apply when the MRP requires beach and shoreline standard observations. Standard observations shall include the following:

a. *Material of wastewater origin*: presence or absence, description of material, estimated size of affected area, and source.

b. *Beneficial use*: estimate number of people participating in recreational water contact, non-water contact, or fishing activities.

4. Land Retention or Disposal Area Observations

The requirements of this section only apply to facilities with onsite surface impoundments or disposal areas that are in use. This section applies to both liquid and solid wastes, whether confined or unconfined. The Discharger shall conduct the following for each impoundment:

a. Determine the amount of freeboard at the lowest point of dikes confining liquid wastes.

b. Report evidence of leaching liquid from area of confinement and estimated size of affected area. Show affected area on a sketch and volume of flow (e.g., gallons per minute [gpm]).

c. Regarding odor, describe presence or absence, characterization, source, distance of travel, and wind direction.

d. Estimate number of waterfowl and other water-associated birds in the disposal area and vicinity.

5. Periphery of Waste Treatment and/or Disposal Facilities Observations

The requirements of this section only apply when the MRP specifies periphery standard observations. Standard observations shall include the following:

a. *Odor*: presence or absence, characterization, source, and distance of travel.

b. *Weather conditions*: wind direction and estimated velocity.

IV. STANDARD PROVISIONS – RECORDS

A. Records to be Maintained – This supplements IV.A of Standard Provisions (Attachment D)

The Discharger shall maintain records in a manner and at a location (e.g., wastewater treatment plant or Discharger offices) such that the records are accessible to Regional Water Board staff. The minimum period of retention specified in Section IV, Records, of the Federal Standard Provisions shall be extended during the course of any unresolved litigation regarding the subject discharge, or when requested by the Regional Water Board or Regional Administrator of USEPA, Region IX.

A copy of the permit shall be maintained at the discharge facility and be available at all times to operating personnel.

B. Records of monitoring information shall include – This supplements IV.B of Standard Provision (Attachment D)

1. Analytical Information

Records shall include analytical method detection limits, minimum levels, reporting levels, and related quantification parameters.

2. Flow Monitoring Data

For all required flow monitoring (e.g., influent and effluent flows), the additional records shall include the following, unless otherwise stipulated by the MRP:

a. Total volume for each day; and

b. Maximum, minimum, and average daily flows for each calendar month.

3. Wastewater Treatment Process Solids

a. For each treatment unit process that involves solids removal from the wastewater stream, records shall include the following:

   1) Total volume or mass of solids removed from each collection unit (e.g., grit, skimmings, undigested biosolids, or combination) for each calendar month or other time period as appropriate, but not to exceed annually; and

   2) Final disposition of such solids (e.g., landfill, other subsequent treatment unit).

b. For final dewatered biosolids from the treatment plant as a whole, records shall include the following:

   1) Total volume or mass of dewatered biosolids for each calendar month;

   2) Solids content of the dewatered biosolids; and

   3) Final disposition of dewatered biosolids (disposal location and disposal method).

4. Disinfection Process

For the disinfection process, these additional records shall be maintained documenting process operation and performance:

a. For bacteriological analyses:

   1) Wastewater flow rate at the time of sample collection; and

   2) Required statistical parameters for cumulative bacterial values (e.g., moving median or geometric mean for the number of samples or sampling period identified in this Order).

b. For the chlorination process, when chlorine is used for disinfection, at least daily average values for the following:

   1) Chlorine residual of treated wastewater as it enters the contact basin (mg/L);

   2) Chlorine dosage (kg/day); and

   3) Dechlorination chemical dosage (kg/day).

5. **Treatment Process Bypasses**

A chronological log of all treatment process bypasses, including wet weather blending, shall include the following:

a. Identification of the treatment process bypassed;

b. Dates and times of bypass beginning and end;

c. Total bypass duration;

d. Estimated total bypass volume; and

e. Description of, or reference to other reports describing, the bypass event, the cause, the corrective actions taken (except for wet weather blending that is in compliance with permit conditions), and any additional monitoring conducted.

6. **Treatment Facility Overflows**

This section applies to records for overflows at the treatment facility. This includes the headworks and all units and appurtenances downstream. The Discharger shall retain a chronological log of overflows at the treatment facility and records supporting the information provided in section V.E.2.

C. Claims of Confidentiality – Not Supplemented

V. STANDARD PROVISIONS – REPORTING

A. Duty to Provide Information – Not Supplemented

B. Signatory and Certification Requirements – Not Supplemented

C. Monitoring Reports – This section supplements V.C of Standard Provisions (Attachment D)

1. **Self Monitoring Reports**

For each reporting period established in the MRP, the Discharger shall submit an SMR to the Regional Water Board in accordance with the requirements listed in this document and at the frequency the MRP specifies. The purpose of the SMR is to document treatment performance, effluent quality, and compliance with the waste discharge requirements of this Order.

a. Transmittal letter

Each SMR shall be submitted with a transmittal letter. This letter shall include the following:

1) Identification of all violations of effluent limits or other waste discharge requirements found during the reporting period;

2) Details regarding violations: parameters, magnitude, test results, frequency, and dates;

3) Causes of violations;

4) Discussion of corrective actions taken or planned to resolve violations and prevent recurrences, and dates or time schedule of action implementation (if previous reports have been submitted that address corrective actions, reference to the earlier reports is satisfactory);

5) Data invalidation (Data should not be submitted in an SMR if it does not meet quality assurance/quality control standards. However, if the Discharger wishes to invalidate any measurement after it was submitted in an SMR, a letter shall identify the measurement suspected to be invalid and state the Discharger's intent to submit, within 60 days, a formal request to invalidate the measurement. This request shall include the original measurement in question, the reason for invalidating the measurement, all relevant documentation that supports invalidation [e.g., laboratory sheet, log entry, test results, etc.], and discussion of the corrective actions taken or planned [with a time schedule for completion] to prevent recurrence of the sampling or measurement problem.);

6) If the Discharger blends, the letter shall describe the duration of blending events and certify whether blended effluent was in compliance with the conditions for blending; and

7) Signature (The transmittal letter shall be signed according to Section V.B of this Order, Attachment D – Standard Provisions.).

b. Compliance evaluation summary

Each report shall include a compliance evaluation summary. This summary shall include each parameter for which the permit specifies effluent limits, the number of samples taken during the monitoring period, and the number of samples that exceed applicable effluent limits.

c. Results of analyses and observations

1) Tabulations of all required analyses and observations, including parameter, date, time, sample station, type of sample, test result, method detection limit, method minimum level, and method reporting level, if applicable, signed by the laboratory director or other responsible official.

2) When determining compliance with an average monthly effluent limitation and more than one sample result is available in a month, the Discharger shall compute the arithmetic mean unless the data set contains one or more reported determinations of detected but not quantified (DNQ) or nondetect (ND). In those cases, the Discharger shall compute the median in place of the arithmetic mean in accordance with the following procedure:

i. The data set shall be ranked from low to high, reported ND determinations lowest, DNQ determinations next, followed by quantified values (if any). The order of the individual ND or DNQ determinations is unimportant.

ii. The median value of the data set shall be determined. If the data set has an odd number of data points, then the median is the middle value. If the data set has an even number of data points, then the median is the average of the two values around the middle unless one or both of the points are ND or DNQ, in which case the median value shall be the lower of the two data points where DNQ is lower than a value and ND is lower than DNQ.

If a sample result, or the arithmetic mean or median of multiple sample results, is below the reporting limit, and there is evidence that the priority pollutant is present in the effluent above an effluent limitation and the Discharger conducts a Pollutant Minimization Program, the Discharger shall not be deemed out of compliance.

3) Dioxin-TEQ Reporting: The Discharger shall report for each dioxin and furan congener the analytical results of effluent monitoring, including the quantifiable limit (reporting level), the method detection limit, and the measured concentration. The Discharger shall report all measured values of individual congeners, including data qualifiers. When calculating dioxin-TEQ, the Discharger shall set congener concentrations below the minimum levels (ML) to zero. The Discharger shall calculate and report dioxin-TEQs using the following formula, where the MLs, toxicity equivalency factors (TEFs), and bioaccumulation equivalency factors (BEFs) are as provided in Table A:

$$\text{Dioxin-TEQ} = \Sigma\, (C_x \times TEF_x \times BEF_x)$$

where: C_x = measured or estimated concentration of congener *x*
TEF_x = toxicity equivalency factor for congener x
BEFx = bioaccumulation equivalency factor for congener *x*

Table A

Minimum Levels, Toxicity Equivalency Factors,
and Bioaccumulation Equivalency Factors

Dioxin or Furan Congener	Minimum Level (pg/L)	1998 Toxicity Equivalency Factor (TEF)	Bioaccumulation Equivalency Factor (BEF)
2,3,7,8-TCDD	10	1.0	1.0
1,2,3,7,8-PeCDD	50	1.0	0.9
1,2,3,4,7,8-HxCDD	50	0.1	0.3
1,2,3,6,7,8-HxCDD	50	0.1	0.1
1,2,3,7,8,9-HxCDD	50	0.1	0.1
1,2,3,4,6,7,8-HpCDD	50	0.01	0.05
OCDD	100	0.0001	0.01
2,3,7,8-TCDF	10	0.1	0.8
1,2,3,7,8-PeCDF	50	0.05	0.2
2,3,4,7,8-PeCDF	50	0.5	1.6
1,2,3,4,7,8-HxCDF	50	0.1	0.08
1,2,3,6,7,8-HxCDF	50	0.1	0.2
1,2,3,7,8,9-HxCDF	50	0.1	0.6
2,3,4,6,7,8-HxCDF	50	0.1	0.7
1,2,3,4,6,7,8-HpCDF	50	0.01	0.01
1,2,3,4,7,8,9-HpCDF	50	0.01	0.4
OCDF	100	0.0001	0.02

d. Data reporting for results not yet available

The Discharger shall make all reasonable efforts to obtain analytical data for required parameter sampling in a timely manner. Certain analyses require additional time to complete analytical processes and report results. For cases where required monitoring parameters require additional time to complete analytical processes and reports, and results are not available in time to be included in the SMR for the subject monitoring period, the Discharger shall describe such circumstances in the SMR and include the data for these parameters and relevant discussions of any observed exceedances in the next SMR due after the results are available.

e. Flow data

The Discharger shall provide flow data tabulation pursuant to Section IV.B.2.

f. Annual self monitoring report requirements

By the date specified in the MRP, the Discharger shall submit an annual report to the Regional Water Board covering the previous calendar year. The report shall contain the following:

1) Annual compliance summary table of treatment plant performance, including documentation of any blending events;

2) Comprehensive discussion of treatment plant performance and compliance with the permit (This discussion shall include any corrective actions taken or planned, such as changes to facility equipment or operation practices that may be needed to achieve compliance, and any other actions taken or planned that are intended to improve performance and reliability of the Discharger's wastewater collection, treatment, or disposal practices.);

3) Both tabular and graphical summaries of the monitoring data for the previous year if parameters are monitored at a frequency of monthly or greater;

4) List of approved analyses, including the following:

   (i) List of analyses for which the Discharger is certified;

   (ii) List of analyses performed for the Discharger by a separate certified laboratory (copies of reports signed by the laboratory director of that laboratory shall not be submitted but be retained onsite); and

   (iii) List of "waived" analyses, as approved;

5) Plan view drawing or map showing the Discharger's facility, flow routing, and sampling and observation station locations;

6) Results of annual facility inspection to verify that all elements of the SWPP Plan are accurate and up to date (only required if the Discharger does not route all storm water to the headworks of its wastewater treatment plant); and

7) Results of facility report reviews (The Discharger shall regularly review, revise, and update, as necessary, the O&M Manual, the Contingency Plan, the Spill Prevention Plan, and Wastewater Facilities Status Report so that these documents remain useful and relevant to current practices. At a minimum, reviews shall be conducted annually. The Discharger shall include, in each Annual Report, a description or summary of review and evaluation procedures, recommended or planned actions, and an estimated time schedule for implementing these actions. The Discharger shall complete changes to these documents to ensure they are up-to-date.).

g. Report submittal

The Discharger shall submit SMRs to:

California Regional Water Quality Control Board
San Francisco Bay Region
1515 Clay Street, Suite 1400
Oakland, CA 94612
Attn: NPDES Wastewater Division

h. Reporting data in electronic format

The Discharger has the option to submit all monitoring results in an electronic reporting format approved by the Executive Officer. If the Discharger chooses to submit SMRs electronically, the following shall apply:

1) *Reporting Method*: The Discharger shall submit SMRs electronically via a process approved by the Executive Officer (see, for example, the letter dated December 17, 1999, "Official Implementation of Electronic Reporting System [ERS]" and the progress report letter dated December 17, 2000).

2) *Monthly or Quarterly Reporting Requirements*: For each reporting period (monthly or quarterly as specified in the MRP), the Discharger shall submit an electronic SMR to the Regional Water Board in accordance with the provisions of Section V.C.1.a-e, except for requirements under Section V.C.1.c(1) where ERS does not have fields for dischargers to input certain information (e.g., sample time). However, until USEPA approves the electronic signature or other signature technologies, Dischargers that use ERS shall submit a hard copy of the original transmittal letter, an ERS printout of the data sheet, and a violation report (a receipt of the electronic transmittal shall be retained by the Discharger). This electronic SMR submittal suffices for the signed tabulations specified under Section V.C.1.c(1).

3) *Annual Reporting Requirements*: Dischargers who have submitted data using the ERS for at least one calendar year are exempt from submitting the portion of the annual report required under Section V.C.1.f(1) and (3).

D. Compliance Schedules – Not supplemented

E. Twenty-Four Hour Reporting – This section supplements V.E of Standard Provision (Attachment D)

1. Spill of Oil or Other Hazardous Material Reports

a. Within 24 hours of becoming aware of a spill of oil or other hazardous material that is not contained onsite and completely cleaned up, the Discharger shall report by telephone to the Regional Water Board at (510) 622-2369.

b. The Discharger shall also report such spills to the State Office of Emergency Services [(800) 852-7550] only when the spills are in accordance with applicable reporting quantities for hazardous materials.

c. The Discharger shall submit a written report to the Regional Water Board within five working days following telephone notification unless directed otherwise by Regional Water Board staff. A report submitted electronically is acceptable. The written report shall include the following:

1) Date and time of spill, and duration if known;

2) Location of spill (street address or description of location);

3) Nature of material spilled;

4) Quantity of material involved;

5) Receiving water body affected, if any;

6) Cause of spill;

7) Estimated size of affected area;

8) Observed impacts to receiving waters (e.g., oil sheen, fish kill, water discoloration);

9) Corrective actions taken to contain, minimize, or clean up the spill;

10) Future corrective actions planned to be taken to prevent recurrence, and schedule of implementation; and

11) Persons or agencies notified.

2. Unauthorized Discharges from Municipal Wastewater Treatment Plants[1]

The following requirements apply to municipal wastewater treatment plants that experience an unauthorized discharge at their treatment facilities and are consistent with and supercede requirements imposed on the Discharger by the Executive Officer by letter of May 1, 2008, issued pursuant to California Water Code Section 13383.

a. Two (2)-Hour Notification

For any unauthorized discharges that result in a discharge to a drainage channel or a surface water, the Discharger shall, as soon as possible, but not later than two (2) hours after becoming aware of the discharge, notify the State Office of Emergency Services (800-852-7550), the local health officers or directors of environmental health with jurisdiction over the affected water bodies, and the Regional Water Board. The notification to the Regional Water Board shall be via the Regional Water Board's online reporting system at www.wbers.net, and shall include the following:

1) Incident description and cause;

2) Location of threatened or involved waterway(s) or storm drains;

3) Date and time the unauthorized discharge started;

4) Estimated quantity and duration of the unauthorized discharge (to the extent known), and the estimated amount recovered;

5) Level of treatment prior to discharge (e.g., raw wastewater, primary treated, undisinfected secondary treated, and so on); and

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

6) Identity of the person reporting the unauthorized discharge.

b. 24-hour Certification

Within 24 hours, the Discharger shall certify to the Regional Water Board, at www.wbers.net, that the State Office of Emergency Services and the local health officers or directors of environmental health with jurisdiction over the affected water bodies have been notified of the unauthorized discharge.

c. 5-Day Written Report

Within five business days, the Discharger shall submit a written report, via the Regional Water Board's online reporting system at www.wbers.net, that includes, in addition to the information required above, the following:

1) Methods used to delineate the geographical extent of the unauthorized discharge within receiving waters;

2) Efforts implemented to minimize public exposure to the unauthorized discharge;

3) Visual observations of the impacts (if any) noted in the receiving waters (e.g., fish kill, discoloration of water) and the extent of sampling if conducted;

4) Corrective measures taken to minimize the impact of the unauthorized discharge;

5) Measures to be taken to minimize the chances of a similar unauthorized discharge occurring in the future;

6) Summary of Spill Prevention Plan or O&M Manual modifications to be made, if necessary, to minimize the chances of future unauthorized discharges; and

7) Quantity and duration of the unauthorized discharge, and the amount recovered.

d. Communication Protocol

To clarify the multiple levels of notification, certification, and reporting, the current communication requirements for unauthorized discharges from municipal wastewater treatment plants are summarized in Table B that follows.

Table B

Summary of Communication Requirements for Unauthorized Discharges[1] from Municipal Wastewater Treatment Plants

Discharger is required to:	Agency Receiving Information	Time frame	Method for Contact
1. Notify	California Emergency Management Agency (Cal EMA)	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Telephone – (800) 852-7550 (obtain a control number from Cal EMA)
	Local health department	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Depends on local health department
	Regional Water Board	As soon as possible, but not later than **2 hours** after becoming aware of the unauthorized discharge.	Electronic[2] www.wbers.net
2. Certify	Regional Water Board	As soon as possible, but not later than **24 hours** after becoming aware of the unauthorized discharge.	Electronic[3] www.wbers.net
3. Report	Regional Water Board	Within **5 business days** of becoming aware of the unauthorized discharge.	Electronic[4] www.wbers.net

[1] California Code of Regulations, Title 23, Section 2250(b), defines an unauthorized discharge to be a discharge, not regulated by waste discharge requirements, of treated, partially treated, or untreated wastewater resulting from the intentional or unintentional diversion of wastewater from a collection, treatment or disposal system.

[2] In the event that the Discharger is unable to provide online notification within 2 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the notification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the notification information into the Regional Water Board's online system in electronic format.

[3] In most instances, the 2-hour notification will also satisfy 24-hour certification requirements. This is because the notification form includes fields for documenting that OES and the local health department have been contacted. In other words, if the Discharger is able to complete all the fields in the notification form within 2 hours, certification requirements are also satisfied. In the event that the Discharger is unable to provide online certification within 24 hours of becoming aware of an unauthorized discharge, it shall phone the Regional Water Board's spill hotline at (510) 622-2369 and convey the same information contained in the certification form. In addition, within 3 business days of becoming aware of the unauthorized discharge, the Discharger shall enter the certification information into the Regional Water Board's online system in electronic format.

[4] If the Discharger cannot satisfy the 5-day reporting requirements via the Regional Water Board's online reporting system, it shall submit a written report (preferably electronically in pdf) to the appropriate Regional Water Board case manager. In cases where the Discharger cannot satisfy the 5-day reporting requirements via the online reporting system, it must still complete the Regional Water Board's online reporting requirements within 15 calendar days of becoming aware of the unauthorized discharge.

F. Planned Changes – Not supplemented

G. Anticipated Noncompliance – Not supplemented

H. Other Noncompliance – Not supplemented

I. Other Information – Not supplemented

VI. STANDARD PROVISIONS – ENFORCEMENT – Not Supplemented

VII. ADDITIONAL PROVISIONS – NOTIFICATION LEVELS – Not Supplemented

VIII. DEFINITIONS – This section is an addition to Standard Provisions (Attachment D)

More definitions can be found in Attachment A of this NPDES Permit.

1. Arithmetic Calculations

   a. Geometric mean is the antilog of the log mean or the back-transformed mean of the logarithmically transformed variables, which is equivalent to the multiplication of the antilogarithms. The geometric mean can be calculated with either of the following equations:

   $$\text{Geometric Mean} = Anti\log\left(\frac{1}{N}\sum_{i=1}^{N} Log\left(C_i\right)\right)$$

   or

   $$\text{Geometric Mean} = (C_1 * C_2 * \ldots * C_N)^{1/N}$$

   Where "N" is the number of data points for the period analyzed and "C" is the concentration for each of the "N" data points.

   b. Mass emission rate is obtained from the following calculation for any calendar day:

   $$\text{Mass emission rate (lb/day)} = \frac{8.345}{N}\sum_{i=1}^{N} Q_i C_i$$

   $$\text{Mass emission rate (kg/day)} = \frac{3.785}{N}\sum_{i=1}^{N} Q_i C_i$$

   In which "N" is the number of samples analyzed in any calendar day and "Q_i" and "C_i" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" grab samples that may be taken in any calendar day. If a composite sample is taken, "C_i" is the concentration measured in the composite sample and "Q_i" is the average flow rate occurring during the period over which the samples are composited. The daily concentration of a constituent measured over any calendar day shall be determined from the flow-weighted average of the same constituent in the combined waste streams as follows:

C_d = Average daily concentration = $\frac{1}{Q_t}\sum_{i=1}^{N} Q_i C_i$

In which "N" is the number of component waste streams and "Q" and "C" are the flow rate (MGD) and the constituent concentration (mg/L) associated with each of the "N" waste streams. "Q_t" is the total flow rate of the combined waste streams.

c. Maximum allowable mass emission rate, whether for a 24-hour, weekly 7-day, monthly 30-day, or 6-month period, is a limitation expressed as a daily rate determined with the formulas in the paragraph above, using the effluent concentration limit specified in the permit for the period and the specified allowable flow.

d. POTW removal efficiency is the ratio of pollutants removed by the treatment facilities to pollutants entering the treatment facilities (expressed as a percentage). The Discharger shall determine removal efficiencies using monthly averages (by calendar month unless otherwise specified) of pollutant concentration of influent and effluent samples collected at about the same time and using the following equation (or its equivalent):

Removal Efficiency (%) = 100 × [1-(Effluent Concentration/Influent Concentration)]

2. Biosolids means the solids, semi-liquid suspensions of solids, residues, screenings, grit, scum, and precipitates separated from or created in wastewater by the unit processes of a treatment system. It also includes, but is not limited to, all supernatant, filtrate, centrate, decantate, and thickener overflow and underflow in the solids handling parts of the wastewater treatment system.

3. Blending is the practice of recombining wastewater that has been biologically treated with wastewater that has bypassed around biological treatment units.

4. Bottom sediment sample is (1) a separate grab sample taken at each sampling station for the determination of selected physical-chemical parameters, or (2) four grab samples collected from different locations in the immediate vicinity of a sampling station while the boat is anchored and analyzed separately for macroinvertebrates.

5. Composite sample is a sample composed of individual grab samples collected manually or by an automatic sampling device on the basis of time or flow as specified in the MRP. For flow-based composites, the proportion of each grab sample included in the composite sample shall be within plus or minus five percent (+/-5%) of the representative flow rate of the waste stream being measured at the time of grab sample collection. Alternatively, equal volume grab samples may be individually analyzed with the flow-weighted average calculated by averaging flow-weighted ratios of each grab sample analytical result. Grab samples comprising time-based composite samples shall be collected at intervals not greater than those specified in the MRP. The quantity of each grab sample comprising a time-based composite sample shall be a set of flow proportional volumes as specified in the MRP. If a particular time-based or flow-based composite sampling protocol is not specified in the MRP, the Discharger shall determine and implement the most representative sampling protocol for the given parameter subject to Executive Officer approval.

6. Depth-integrated sample is defined as a water or waste sample collected by allowing a sampling device to fill during a vertical traverse in the waste or receiving water body being sampled. The

Discharger shall collect depth-integrated samples in such a manner that the collected sample will be representative of the waste or water body at that sampling point.

7. Flow sample is an accurate measurement of the average daily flow volume using a properly calibrated and maintained flow measuring device.

8. Grab sample is an individual sample collected in a short period of time not exceeding 15 minutes. Grab samples represent only the condition that exists at the time the wastewater is collected.

9. Initial dilution is the process that results in the rapid and irreversible turbulent mixing of wastewater with receiving water around the point of discharge.

10. Overflow is the intentional or unintentional spilling or forcing out of untreated or partially treated wastes from a transport system (e.g., through manholes, at pump stations, and at collection points) upstream from the treatment plant headworks or from any part of a treatment plant facility.

11. Priority pollutants are those constituents referred to in 40 CFR Part 122 as promulgated in the Federal Register, Vol. 65, No. 97, Thursday, May 18, 2000, also known as the California Toxics Rule, the presence or discharge of which could reasonably be expected to interfere with maintaining designated uses.

12. Storm water means storm water runoff, snow melt runoff, and surface runoff and drainage. It excludes infiltration and runoff from agricultural land.

13. Toxic pollutant means any pollutant listed as toxic under federal Clean Water Act section 307(a)(1) or under 40 CFR 401.15.

14. Untreated waste is raw wastewater.

15. Waste, waste discharge, discharge of waste, and discharge are used interchangeably in the permit. The requirements of the permit apply to the entire volume of water, and the material therein, that is disposed of to surface and ground waters of the State of California.

Table C

List of Monitoring Parameters and Analytical Methods

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
1.	Antimony	204.2					10	5	50	0.5	5	0.5		1000
2.	Arsenic	206.3				20		2	10	2	2	1		1000
3.	Beryllium						20	0.5	2	0.5	1			1000
4.	Cadmium	200 or 213					10	0.5	10	0.25	0.5			1000
5a.	Chromium (III)	SM 3500												
5b.	Chromium (VI)	SM 3500				10	5							1000
	Chromium (total)[3]	SM 3500					50	2	10	0.5	1			1000
6.	Copper	200.9					25	5	10	0.5	2			1000
7.	Lead	200.9					20	5	5	0.5	2			10,000
8.	Mercury	1631 (note)[4]												
9.	Nickel	249.2					50	5	20	1	5			1000
10.	Selenium	200.8 or SM 3114B or C						5	10	2	5	1		1000
11.	Silver	272.2					10	1	10	0.25	2			1000
12.	Thallium	279.2					10	2	10	1	5			1000
13.	Zinc	200 or 289					20		20	1	10			
14.	Cyanide	SM 4500 CN^- C or I				5								
15.	Asbestos (only required for dischargers to MUN waters)[5]	0100.2 [6]												
16.	2,3,7,8-TCDD and 17 congeners (Dioxin)	1613												
17.	Acrolein	603	2.0	5										
18.	Acrylonitrile	603	2.0	2										
19.	Benzene	602	0.5	2										
33.	Ethylbenzene	602	0.5	2										
39.	Toluene	602	0.5	2										
20.	Bromoform	601	0.5	2										
21.	Carbon Tetrachloride	601	0.5	2										
22.	Chlorobenzene	601	0.5	2										
23.	Chlorodibromomethane	601	0.5	2										
24.	Chloroethane	601	0.5	2										
25.	2-Chloroethylvinyl Ether	601	1	1										

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[1] The suggested method is the USEPA Method unless otherwise specified (SM = Standard Methods). The Discharger may use another USEPA-approved or recognized method if that method has a level of quantification below the applicable water quality objective. Where no method is suggested, the Discharger has the discretion to use any standard method.

[2] Minimum levels are from the *State Implementation Policy*. They are the concentration of the lowest calibration standard for that technique based on a survey of contract laboratories. Laboratory techniques are defined as follows: GC = Gas Chromatography; GCMS = Gas Chromatography/Mass Spectrometry; LC = High Pressure Liquid Chromatography; Color = Colorimetric; FAA = Flame Atomic Absorption; GFAA = Graphite Furnace Atomic Absorption; ICP = Inductively Coupled Plasma; ICPMS = Inductively Coupled Plasma/Mass Spectrometry; SPGFAA = Stabilized Platform Graphite Furnace Atomic Absorption (i.e., USEPA 200.9); Hydride = Gaseous Hydride Atomic Absorption; CVAA = Cold Vapor Atomic Absorption; DCP = Direct Current Plasma.

[3] Analysis for total chromium may be substituted for analysis of chromium (III) and chromium (VI) if the concentration measured is below the lowest hexavalent chromium criterion (11 ug/l).

[4] The Discharger shall use ultra-clean sampling (USEPA Method 1669) and ultra-clean analytical methods (USEPA Method 1631) for mercury monitoring. The minimum level for mercury is 2 ng/l (or 0.002 ug/l).

[5] MUN = Municipal and Domestic Supply. This designation, if applicable, is in the Findings of the permit.

[6] *Determination of Asbestos Structures over 10 [micrometers] in Length in Drinking Water Using MCE Filters*, USEPA 600/R-94-134, June 1994.

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
26.	Chloroform	601	0.5	2										
75.	1,2-Dichlorobenzene	601	0.5	2										
76.	1,3-Dichlorobenzene	601	0.5	2										
77.	1,4-Dichlorobenzene	601	0.5	2										
27.	Dichlorobromomethane	601	0.5	2										
28.	1,1-Dichloroethane	601	0.5	1										
29.	1,2-Dichloroethane	601	0.5	2										
30.	1,1-Dichloroethylene or 1,1-Dichloroethene	601	0.5	2										
31.	1,2-Dichloropropane	601	0.5	1										
32.	1,3-Dichloropropylene or 1,3-Dichloropropene	601	0.5	2										
34.	Methyl Bromide or Bromomethane	601	1.0	2										
35.	Methyl Chloride or Chloromethane	601	0.5	2										
36.	Methylene Chloride or Dichlorormethane	601	0.5	2										
37.	1,1,2,2-Tetrachloroethane	601	0.5	1										
38.	Tetrachloroethylene	601	0.5	2										
40.	1,2-Trans-Dichloroethylene	601	0.5	1										
41.	1,1,1-Trichloroethane	601	0.5	2										
42.	1,1,2-Trichloroethane	601	0.5	2										
43.	Trichloroethene	601	0.5	2										
44.	Vinyl Chloride	601	0.5	2										
45.	2-Chlorophenol	604	2	5										
46.	2,4-Dichlorophenol	604	1	5										
47.	2,4-Dimethylphenol	604	1	2										
48.	2-Methyl-4,6-Dinitrophenol or Dinitro-2-methylphenol	604	10	5										
49.	2,4-Dinitrophenol	604	5	5										
50.	2-Nitrophenol	604		10										
51.	4-Nitrophenol	604	5	10										
52.	3-Methyl-4-Chlorophenol	604	5	1										
53.	Pentachlorophenol	604	1	5										
54.	Phenol	604	1	1		50								
55.	2,4,6-Trichlorophenol	604	10	10										
56.	Acenaphthene	610 HPLC	1	1	0.5									
57.	Acenaphthylene	610 HPLC		10	0.2									
58.	Anthracene	610 HPLC		10	2									
60.	Benzo(a)Anthracene or 1,2 Benzanthracene	610 HPLC	10	5										
61.	Benzo(a)Pyrene	610 HPLC		10	2									
62.	Benzo(b)Fluoranthene or 3,4 Benzofluoranthene	610 HPLC		10	10									
63.	Benzo(ghi)Perylene	610 HPLC		5	0.1									
64.	Benzo(k)Fluoranthene	610 HPLC		10	2									
74.	Dibenzo(a,h)Anthracene	610 HPLC		10	0.1									
86.	Fluoranthene	610 HPLC	10	1	0.05									
87.	Fluorene	610 HPLC		10	0.1									
92.	Indeno(1,2,3-cd) Pyrene	610 HPLC		10	0.05									
100.	Pyrene	610 HPLC		10	0.05									
68.	Bis(2-Ethylhexyl)Phthalate	606 or 625	10	5										
70.	Butylbenzyl Phthalate	606 or 625	10	10										
79.	Diethyl Phthalate	606 or 625	10	2										

CTR No.	Pollutant/Parameter	Analytical Method[1]	Minimum Levels[2] (µg/l)											
			GC	GCMS	LC	Color	FAA	GFAA	ICP	ICP MS	SPGFAA	HYD RIDE	CVAA	DCP
80.	Dimethyl Phthalate	606 or 625	10	2										
81.	Di-n-Butyl Phthalate	606 or 625		10										
84.	Di-n-Octyl Phthalate	606 or 625		10										
59.	Benzidine	625		5										
65.	Bis(2-Chloroethoxy)Methane	625		5										
66.	Bis(2-Chloroethyl)Ether	625	10	1										
67.	Bis(2-Chloroisopropyl)Ether	625	10	2										
69.	4-Bromophenyl Phenyl Ether	625	10	5										
71.	2-Chloronaphthalene	625		10										
72.	4-Chlorophenyl Phenyl Ether	625		5										
73.	Chrysene	625		10	5									
78.	3,3'-Dichlorobenzidine	625		5										
82.	2,4-Dinitrotoluene	625	10	5										
83.	2,6-Dinitrotoluene	625		5										
85.	1,2-Diphenylhydrazine (note)[7]	625		1										
88.	Hexachlorobenzene	625	5	1										
89.	Hexachlorobutadiene	625	5	1										
90.	Hexachlorocyclopentadiene	625	5	5										
91.	Hexachloroethane	625	5	1										
93.	Isophorone	625	10	1										
94.	Naphthalene	625	10	1	0.2									
95.	Nitrobenzene	625	10	1										
96.	N-Nitrosodimethylamine	625	10	5										
97.	N-Nitrosodi-n-Propylamine	625	10	5										
98.	N-Nitrosodiphenylamine	625	10	1										
99.	Phenanthrene	625		5	0.05									
101.	1,2,4-Trichlorobenzene	625	1	5										
102.	Aldrin	608	0.005											
103.	α-BHC	608	0.01											
104.	β-BHC	608	0.005											
105.	γ-BHC (Lindane)	608	0.02											
106.	δ-BHC	608	0.005											
107.	Chlordane	608	0.1											
108.	4,4'-DDT	608	0.01											
109.	4,4'-DDE	608	0.05											
110.	4,4'-DDD	608	0.05											
111.	Dieldrin	608	0.01											
112.	Endosulfan (alpha)	608	0.02											
113.	Endosulfan (beta)	608	0.01											
114.	Endosulfan Sulfate	608	0.05											
115.	Endrin	608	0.01											
116.	Endrin Aldehyde	608	0.01											
117.	Heptachlor	608	0.01											
118.	Heptachlor Epoxide	608	0.01											
119-125	PCBs: Aroclors 1016, 1221, 1232, 1242, 1248, 1254, 1260	608	0.5											
126.	Toxaphene	608	0.5											

[7] Measurement for 1,2-Diphenylhydrazine may use azobenzene as a screen: if azobenzene is measured at >1 ug/l, then the Discharger shall analyze for 1,2-Diphenylhydrazine.

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN FRANCISCO BAY REGION

ATTACHMENT H
PRETREATMENT PROGRAM PROVISIONS

For

NPDES POTW WASTEWATER DISCHARGE PERMITS

March 2011
Corrected May 2011

TABLE OF CONTENTS Page

Attachment H: Pretreatment Program Provisions

1. The Discharger shall be responsible and liable for the performance of all Control Authority pretreatment requirements contained in 40 CFR 403, including any regulatory revisions to Part 403. Where a Part 403 revision is promulgated after the effective date of the Discharger's permit and places mandatory actions upon the Discharger as Control Authority but does not specify a timetable for completion of the actions, the Discharger shall complete the required actions within six months from the issuance date of this permit or six months from the effective date of the Part 403 revisions, whichever comes later.

   (If the Discharger cannot complete the required actions within the above six-month period due to the need to process local adoption of sewer use ordinance modifications or other substantial pretreatment program modifications, the Discharger shall notify the Executive Officer in writing at least 60 days prior to the six-month deadline. The written notification shall include a summary of completed required actions, an explanation for why the six month deadline cannot be met, and a proposed timeframe to complete the rest of the required actions as soon as practical but not later than within twelve months of the issuance date of this permit or twelve months of the effective date of the Part 403 revisions, whichever comes later. The Executive Officer will notify the Discharger in writing within 30 days of receiving the request if the extension is not approved.)

   The United States Environmental Protection Agency (USEPA), the State and/or other appropriate parties may initiate enforcement action against a nondomestic user for noncompliance with applicable standards and requirements as provided in the Clean Water Act (Act).

2. The Discharger shall enforce the requirements promulgated under Sections 307(b), 307(c), 307(d) and 402(b) of the Act with timely, appropriate and effective enforcement actions. The Discharger shall cause nondomestic users subject to Federal Categorical Standards to achieve compliance no later than the date specified in those requirements or, in the case of a new nondomestic user, upon commencement of the discharge.

3. The Discharger shall perform the pretreatment functions as required in 40 CFR 403 and amendments or modifications thereto including, but not limited to:

   A) Implement the necessary legal authorities to fully implement the pretreatment regulations as provided in 40 CFR 403.8(f)(1);

   B) Implement the programmatic functions as provided in 40 CFR 403.8(f)(2);

   C) Publish an annual list of nondomestic users in significant noncompliance as provided per 40 CFR 403.8(f)(2)(viii);

   D) Provide for the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3); and

   E) Enforce the national pretreatment standards for prohibited discharges and categorical standards as provided in 40 CFR 403.5 and 403.6, respectively.

4. The Discharger shall submit annually a report to USEPA Region 9, the State Water Board and the Regional Water Board describing its pretreatment program activities over the previous calendar year. In the event that the Discharger is not in compliance with any conditions or requirements of the Pretreatment Program, the Discharger shall also include the reasons for noncompliance and a plan and schedule for achieving compliance. The report shall contain, but is not limited to, the information specified in Appendix H-1 entitled, “Requirements for Pretreatment Annual Reports.” The annual report is due each year on February 28.

5. The Discharger shall submit a pretreatment semiannual report to USEPA Region 9, the State Water Board and the Regional Water Board describing the status of its significant industrial users (SIUs). The report shall contain, but is not limited to, information specified in Appendix H-2 entitled, “Requirements for Pretreatment Semiannual Reports.” The semiannual report is due July 31 for the period January through June. The information for the period July through December of each year shall be included in the Annual Report identified in Appendix H-1. The Executive Officer may exempt the Discharger from the semiannual reporting requirements on a case by case basis subject to State Water Board and USEPA’s comment and approval.

6. The Discharger shall conduct the monitoring of its treatment plant’s influent, effluent, and sludge (biosolids) as described in Appendix H-4 entitled, “Requirements for Influent, Effluent and Sludge (Biosolids) Monitoring.” (The term “biosolids,” as used in this Attachment, shall have the same meaning as wastewater treatment plant “sludge” and will be used from this point forward.) The Discharger shall evaluate the results of the sampling and analysis during the preparation of the semiannual and annual reports to identify any trends. Signing the certification statement used to transmit the reports shall be deemed to certify the Discharger has completed this data evaluation. A tabulation of the data shall be included in the pretreatment annual report as specified in Appendix H-4. The Executive Officer may require more or less frequent monitoring on a case by case basis.

APPENDIX H-1

REQUIREMENTS FOR PRETREATMENT ANNUAL REPORTS

The Pretreatment Annual Report is due each year on February 28 and shall contain activities conducted during the previous calendar year. The purpose of the Annual Report is to:

- Describe the status of the Discharger's pretreatment program; and
- Report on the effectiveness of the program, as determined by comparing the results of the preceding year's program implementation.

The report shall contain, at a minimum, the following information:

1) **Cover Sheet**

The cover sheet shall include:

A) The name(s) and National Pollutant Discharge Elimination Discharge System (NPDES) permit number(s) of the Discharger(s) that is part of the Pretreatment Program;

B) The name, address and telephone number of a pretreatment contact person;

C) The period covered in the report;

D) A statement of truthfulness; and

E) The dated signature of a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for overall operation of the Publicly Owned Treatment Works (POTW) (40 CFR 403.12(m)).

2) **Introduction**

This section shall include:

A) Any pertinent background information related to the Discharger and/or the nondomestic user base of the area;

B) List of applicable interagency agreements used to implement the Discharger's pretreatment program (e.g., Memoranda of Understanding (MOU) with satellite sanitary sewer collection systems); and

C) A status summary of the tasks required by a Pretreatment Compliance Inspection (PCI), Pretreatment Compliance Audit (PCA), Cleanup and Abatement Order (CAO), or other pretreatment-related enforcement actions required by the Regional Water Board or the USEPA. A more detailed discussion can be referenced and included in the section entitled, "Program Changes," if needed.

3) **Definitions**

This section shall include a list of key terms and their definitions that the Discharger uses to describe or characterize elements of its pretreatment program, or the Discharger may provide a reference to its website if the applicable definitions are available on-line.

4) **Discussion of Upset, Interference and Pass Through**

This section shall include a discussion of Upset, Interference or Pass Through incidents, if any, at the Discharger's treatment plant(s) that the Discharger knows of or suspects were caused by nondomestic user discharges. Each incident shall be described, at a minimum, consisting of the following information:

A) A description of what occurred;

B) A description of what was done to identify the source;

C) The name and address of the nondomestic user responsible;

D) The reason(s) why the incident occurred;

E) A description of the corrective actions taken; and

F) An examination of the local and federal discharge limits and requirements for the purposes of determining whether any additional limits or changes to existing requirements may be necessary to prevent other Upset, Interference or Pass Through incidents.

5) **Influent, Effluent and Biosolids Monitoring Results**

The Discharger shall evaluate the influent, effluent and biosolids monitoring results as specified in Appendix H-4 in preparation of this report. The Discharger shall retain the analytical laboratory reports with the Quality Assurance and Quality Control (QA/QC) data validation and make these reports available upon request.

This section shall include:

A) Description of the sampling procedures and an analysis of the results (see Appendix H-4 for specific requirements);
B) Tabular summary of the compounds detected (compounds measured above the detection limit for the analytical method used) for the monitoring data generated during the reporting year as specified in Appendix H-4;
C) Discussion of the investigation findings into any contributing sources of the compounds that exceed NPDES limits; and
D) Graphical representation of the influent and effluent metal monitoring data for the past five years with a discussion of any trends.

6) **Inspection, Sampling and Enforcement Programs**

This section shall include at a minimum the following information:

A) Inspections: Summary of the inspection program (e.g., criteria for determining the frequency of inspections and inspection procedures);

B) Sampling Events: Summary of the sampling program (e.g., criteria for determining the frequency of sampling and chain of custody procedures); and

C) Enforcement: Summary of Enforcement Response Plan (ERP) implementation including dates for adoption, last revision and submission to the Regional Water Board.

7) **Updated List of Regulated SIUs**

This section shall contain a list of all of the federal categories that apply to SIUs regulated by the Discharger. The specific categories shall be listed including the applicable 40 CFR subpart and section, and pretreatment standards (both maximum and average limits). Local limits developed by the Discharger shall be presented in a table including the applicability of the local limits to SIUs. If local limits do not apply uniformly to SIUs, specify the applicability in the tables listing the categorical industrial users (CIUs) and non-categorical SIUs. Tables developed in Sections 7A and 7B can be used to present or reference this information.

A) CIUs - Include a table that alphabetically lists the CIUs regulated by the Discharger as of the end of the reporting period. This list shall include:

   i. Name;

   ii. Address;

   iii. Applicable federal category(ies);

   iv. Reference to the location where the applicable Federal Categorical Standards are presented in the report;

   v. Identify all deletions and additions keyed to the list submitted in the previous annual report. All deletions shall be briefly explained (e.g., closure, name change, ownership change, reclassification, declassification); and

   vi. Information, calculations and data used to determine the limits for those CIUs for which a combined waste stream formula is applied.

B) Non-categorical SIUs - Include a table that alphabetically lists the SIUs not subject to any federal categorical standards that were regulated by the Discharger as of the end of the reporting period. This list shall include:

   i. Name;

   ii. Address;

iii. A brief description of the type of business;
iv. Identify all deletions and additions keyed to the list submitted in the previous annual report. All deletions shall be briefly explained (e.g., closure, name change, ownership change, reclassification, declassification); and

v. Indicate the applicable discharge limits (e.g., different from local limits) to which the SIUs are subject and reference to the location where the applicable limits (e.g., local discharge limits) are presented in the report.

8) **SIU (categorical and non-categorical) Compliance Activities**

The information required in this section may be combined in the table developed in Section 7 above.

A) **Inspection and Sampling Summary:** This section shall contain a summary of all the SIU inspections and sampling activities conducted by the Discharger and sampling activities conducted by the SIU over the reporting year to gather information and data regarding SIU compliance. The summary shall include:

i. The number of inspections and sampling events conducted for each SIU by the Discharger;

ii. The number of sampling events conducted by the SIU. Identify SIUs that are operating under an approved Total Toxic Organic Management Plan;

iii. The quarters in which the above activities were conducted; and

iv. The compliance status of each SIU, delineated by quarter, and characterized using all applicable descriptions as given below:

a. Consistent compliance;

b. Inconsistent compliance;

c. Significant noncompliance;

d. On a compliance schedule to achieve compliance (include the date final compliance is required);

e. Not in compliance and not on a compliance schedule; and

f. Compliance status unknown, and why not.

B) **Enforcement Summary:** This section shall contain a summary of SIU compliance and enforcement activities during the reporting year. The summary may be included in the summary table developed in section 8A and shall include the names and addresses of all SIUs affected by the actions identified below. For each notice specified in enforcement action “i” through “iv,” indicate whether it was for an infraction of a federal or local standard/limit or requirement.

i. Warning letters or notices of violations regarding SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

ii. Administrative Orders regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

iii. Civil actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

iv. Criminal actions regarding the SIUs' apparent noncompliance with or violation of any federal pretreatment categorical standards and/or requirements, or local limits and/or requirements;

v. Assessment of monetary penalties. Identify the amount of penalty in each case and reason for assessing the penalty;

vi. Order to restrict/suspend discharge to the Discharger; and

vii. Order to disconnect the discharge from entering the Discharger.

C) **July-December Semiannual Data:** For SIU violations/noncompliance during the semiannual reporting period from July 1 through December 31, provide the following information:

i. Name and facility address of the SIU;

ii. Indicate if the SIU is subject to Federal Categorical Standards; if so, specify the category including the subpart that applies;

iii. For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard;

iv. Indicate the compliance status of the SIU for the two quarters of the reporting period; and

v. For violations/noncompliance identified in the reporting period, provide:

a. The date(s) of violation(s);

b. The parameters and corresponding concentrations exceeding the limits and the discharge limits for these parameters; and

c. A brief summary of the noncompliant event(s) and the steps that are being taken to achieve compliance.

9) **Baseline Monitoring Report Update**

This section shall provide a list of CIUs added to the pretreatment program since the last annual report. This list of new CIUs shall summarize the status of the respective Baseline Monitoring Reports (BMR). The BMR must contain the information specified in 40 CFR 403.12(b). For each new CIU, the summary shall indicate when the BMR was due; when the CIU was notified by the Discharger of this requirement; when the CIU submitted the report; and/or when the report is due.

10) **Pretreatment Program Changes**

This section shall contain a description of any significant changes in the Pretreatment Program during the past year including, but not limited to:

A) Legal authority;

B) Local limits;

C) Monitoring/ inspection program and frequency;

D) Enforcement protocol;

E) Program's administrative structure;

F) Staffing level;

G) Resource requirements;

H) Funding mechanism;

I) If the manager of the Discharger's pretreatment program changed, a revised organizational chart shall be included; and

J) If any element(s) of the program is in the process of being modified, this intention shall also be indicated.

11) **Pretreatment Program Budget**

This section shall present the budget spent on the Pretreatment Program. The budget, either by the calendar or fiscal year, shall show the total expenses required to implement the pretreatment program. A brief discussion of the source(s) of funding shall be provided. In addition, the Discharger shall make available upon request specific details on its pretreatment program expense amounts such as for personnel, equipment, and chemical analyses.

12) **Public Participation Summary**

This section shall include a copy of the public notice as required in 40 CFR 403.8(f)(2)(viii). If a notice was not published, the reason shall be stated.

13) **Biosolids Storage and Disposal Practice**

This section shall describe how treated biosolids are stored and ultimately disposed. If a biosolids storage area is used, it shall be described in detail including its location, containment features and biosolids handling procedures.

14) **Other Pollutant Reduction Activities**

This section shall include a brief description of any programs the Discharger implements to reduce pollutants from nondomestic users that are not classified as SIUs. If the Discharger submits any of this program information in an Annual Pollution Prevention Report, reference to this other report shall satisfy this reporting requirement.

15) **Other Subjects**

Other information related to the Pretreatment Program that does not fit into any of the above categories should be included in this section.

16) **Permit Compliance System (PCS) Data Entry Form**

The annual report shall include the PCS Data Entry Form. This form shall summarize the enforcement actions taken against SIUs in the past year. This form shall include the following information:

A) Discharger's name,

B) NPDES Permit number,

C) Period covered by the report,

D) Number of SIUs in significant noncompliance (SNC) that are on a pretreatment compliance schedule,

E) Number of notices of violation and administrative orders issued against SIUs,

F) Number of civil and criminal judicial actions against SIUs,

G) Number of SIUs that have been published as a result of being in SNC, and

H) Number of SIUs from which penalties have been collected.

APPENDIX H-2

REQUIREMENTS FOR JANUARY-JUNE PRETREATMENT SEMIANNUAL REPORT

The pretreatment semiannual report is due on July 31 for pretreatment program activities conducted from January through June unless an exception has been granted by the Regional Water Board's Executive Officer (e.g., pretreatment programs without any SIUs may qualify for an exception to the pretreatment semiannual report). Pretreatment activities conducted from July through December of each year shall be included in the Pretreatment Annual Report as specified in Appendix H-1. The pretreatment semiannual report shall contain, at a minimum the following information:

1) **Influent, Effluent and Biosolids Monitoring**

The influent, effluent and biosolids monitoring results shall be evaluated in preparation of this report. The Discharger shall retain analytical laboratory reports with the QA/QC data validation and make these reports available upon request. The Discharger shall also make available upon request a description of its influent, effluent and biosolids sampling procedures. Violations of any parameter that exceed NPDES limits shall be identified and reported. The contributing source(s) of the parameters that exceed NPDES limits shall be investigated and discussed.

2) **Significant Industrial User Compliance Status**

This section shall contain a list of all SIUs that were not in consistent compliance with all pretreatment standards/limits or requirements for the reporting period. For the reported SIUs, the compliance status for the previous semiannual reporting period shall be included. Once the SIU has determined to be out of compliance, the SIU shall be included in subsequent reports until consistent compliance has been achieved. A brief description detailing the actions that the SIU undertook to come back into compliance shall be provided.

For each SIU on the list, the following information shall be provided:

A) Name and facility address of the SIU;

B) Indicate if the SIU is subject to Federal Categorical Standards; if so, specify the category including the subpart that applies;

C) For SIUs subject to Federal Categorical Standards, indicate if the violation is of a categorical or local standard;

D) Indicate the compliance status of the SIU for the two quarters of the reporting period; and

E) For violations/noncompliance identified in the reporting period, provide:

i. The date(s) of violation(s);

ii. The parameters and corresponding concentrations exceeding the limits and the discharge limits for these parameters; and

iii. A brief summary of the noncompliant event(s) and the steps that are being taken to achieve compliance.

3) **Discharger's Compliance with Pretreatment Program Requirements**

This section shall contain a discussion of the Discharger's compliance status with the Pretreatment Program Requirements as indicated in the latest Pretreatment Compliance Audit (PCA) Report or Pretreatment Compliance Inspection (PCI) Report. It shall contain a summary of the following information:

A) Date of latest PCA or PCI report;

B) Date of the Discharger's response;

C) List of unresolved issues; and

D) Plan(s) and schedule for resolving the remaining issues.

APPENDIX H-3

SIGNATURE REQUIREMENTS FOR PRETREATMENT ANNUAL AND SEMIANNUAL REPORTS

The pretreatment annual and semiannual reports shall be signed by a principal executive officer, ranking elected official, or other duly authorized employee who is responsible for the overall operation of the Discharger [POTW - 40 CFR 403.12(m)]. Signed copies of the reports shall be submitted to the USEPA, the State Water Board, and the Regional Water Board at the following addresses unless the Discharger is instructed by any of these agencies to submit electronic copies of the required reports:

Pretreatment Program Reports
Clean Water Act Compliance Office (WTR-7)
Water Division
Pacific Southwest Region
U.S. Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105-3901

Submit electronic copies only to State and Regional Water Boards:
Pretreatment Program Manager
Regulatory Unit
State Water Resources Control Board
Division of Water Quality-15th Floor
1001 I Street
Sacramento, CA 95814
DMR@waterboards.ca.gov
NPDES_Wastewater@waterboards.ca.gov

Pretreatment Coordinator
NPDES Wastewater Division
SF Bay Regional Water Quality Control Board
1515 Clay Street, Suite 1400
Oakland, CA 94612
(Submit the report as a single Portable Document Format (PDF) file to the Pretreatment Coordinator's folder in the Regional Water Board's File Transfer Protocol (FTP) site. The instructions for using the FTP site can be found at the following internet address:
http://www.waterboards.ca.gov/sanfranciscobay/publications_forms/documents/FTP_Discharger_Guide-12-2010.pdf.)

APPENDIX H-4

REQUIREMENTS FOR INFLUENT, EFFLUENT AND BIOSOLIDS MONITORING

The Discharger shall conduct sampling of its treatment plant's influent, effluent and biosolids at the frequency shown in **the pretreatment requirements table** of the Monitoring and Reporting Program (MRP, Attachment E). When sampling periods coincide, one set of test results, reported separately, may be used for those parameters that are required to be monitored by both the influent and effluent monitoring requirements of the MRP and the Pretreatment Program. The Pretreatment Program monitoring reports as required in Appendices H-1 and H-2 shall be transmitted to the Pretreatment Program Coordinator.

1. Reduction of Monitoring Frequency

The minimum frequency of Pretreatment Program influent, effluent, and biosolids monitoring shall be dependant on the number of SIUs identified in the Discharger's Pretreatment Program as indicated in Table H-1.

Table H-1: Minimum Frequency of Pretreatment Program Monitoring

Number of SIUs	Minimum Frequency
< 5	Once every five years
> 5 and < 50	Once every year
> 50	Twice per year

If the Discharger's required monitoring frequency is greater than the minimum specified in Table H-1, the Discharger may request a reduced monitoring frequency for that constituent(s) as part of its application for permit reissuance if it meets the following criteria:

The monitoring data for the constituent(s) consistently show non-detect (ND) levels for the effluent monitoring and very low (i.e., near ND) levels for influent and biosolids monitoring for a minimum of eight previous years' worth of data.

The Discharger's request shall include tabular summaries of the data and a description of the trends in the industrial, commercial, and residential customers in the Discharger's service area that demonstrate control over the sources of the constituent(s). The Regional Water Board may grant a reduced monitoring frequency in the reissued permit after considering the information provided by the Discharger and any other relevant information.

2. Influent and Effluent Monitoring

The Discharger shall monitor for the parameters using the required sampling and test methods listed in **the pretreatment table** of the MRP. Any test method substitutions must have received prior written Executive Officer approval. Influent and effluent sampling locations shall be the same as those sites specified in the MRP.

The influent and effluent samples should be taken at staggered times to account for treatment plant detention time. Appropriately staggered sampling is considered consistent with the requirement for collection of effluent samples coincident with influent samples in Section III.A.3.a(2) of Attachment G. All samples must be representative of daily operations. Sampling and analysis shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. For effluent monitoring, the reporting limits for the individual parameters shall be at or below the minimum levels (MLs) as stated in the Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California (2000) [also known as the State Implementation Policy (SIP)]; any revisions to the MLs shall be adhered to. If a parameter does not have a stated ML, then the Discharger shall conduct the analysis using the lowest commercially available and reasonably achievable detection levels.

The following report elements should be used to submit the influent and effluent monitoring results. A similarly structured format may be used but will be subject to Regional Water Board approval. The monitoring reports shall be submitted with the Pretreatment Annual Report identified in Appendix H-1.

A) Sampling Procedures, Sample Dechlorination, Sample Compositing, and Data Validation (applicable quality assurance/quality control) shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. The Discharger shall make available upon request its sampling procedures including methods of dechlorination, compositing, and data validation.

B) A tabulation of the test results for the detected parameters shall be provided.

C) Discussion of Results – The report shall include a complete discussion of the test results for the detected parameters. If any pollutants are detected in sufficient concentration to upset, interfere or pass through plant operations, the type of pollutant(s) and potential source(s) shall be noted, along with a plan of action to control, eliminate, and/or monitor the pollutant(s). Any apparent generation and/or destruction of pollutants attributable to chlorination/dechlorination sampling and analysis practices shall be noted.

3. Biosolids Monitoring

Biosolids should be sampled in a manner that will be representative of the biosolids generated from the influent and effluent monitoring events except as noted in (C) below. The same parameters required for influent and effluent analysis shall be included in the biosolids analysis. The biosolids analyzed shall be a composite sample of the biosolids for final disposal consisting of:

A) Biosolids lagoons – 20 grab samples collected at representative equidistant intervals (grid pattern) and composited as a single grab, or

B) Dried stockpile – 20 grab samples collected at various representative locations and depths and composited as a single grab, or

C) Dewatered biosolids - daily composite of 4 representative grab samples each day for 5 days taken at equal intervals during the daily operating shift taken from a) the dewatering units or b) each truckload, and shall be combined into a single 5- day composite.

The USEPA manual, POTW Sludge Sampling and Analysis Guidance Document, August 1989, containing detailed sampling protocols specific to biosolids is recommended as a guidance for sampling procedures. The USEPA manual Analytical Methods of the National Sewage Sludge Survey, September 1990, containing detailed analytical protocols specific to biosolids, is recommended as a guidance for analytical methods.

In determining if the biosolids are a hazardous waste, the Discharger shall adhere to Article 2, "Criteria for Identifying the Characteristics of Hazardous Waste," and Article 3, "Characteristics of Hazardous Waste," of Title 22, California Code of Regulations, sections 66261.10 to 66261.24 and all amendments thereto.

The following report elements should be used to submit the biosolids monitoring results. A similarly structured form may be used but will be subject to Regional Water Board approval. The results shall be submitted with the Pretreatment Annual Report identified in Appendix H-1.

- Sampling Procedures and Data Validation (applicable quality assurance/quality control) shall be performed in accordance with the techniques prescribed in 40 CFR 136 and amendments thereto. The Discharger shall make available upon request its biosolids sampling procedures and data validation methods.

- Test Results – Tabulate the test results for the detected parameters and include the percent solids.

- Discussion of Results – Include a complete discussion of test results for the detected parameters. If the detected pollutant(s) is reasonably deemed to have an adverse effect on biosolids disposal, a plan of action to control, eliminate, and/or monitor the pollutant(s) and the known or potential source(s) shall be included. Any apparent generation and/or destruction of pollutants attributable to chlorination/dechlorination sampling and analysis practices shall be noted.

The Discharger shall also provide a summary table presenting any influent, effluent or biosolids monitoring data for non-priority pollutants that the Discharger believes may be causing or contributing to interference, pass through or adversely impacting biosolids quality.

APPENDIX D – ESTIMATED RECYCLED WATER USE AT SAN QUENTIN PRISON

MEMORANDUM

DATE: May 2, 2007

TO: Bob Castle, San Quentin Prison File

FROM: Kenneth Feil

SUBJECT: Estimated Recycled Water Use at SQP

As of April 27, 2007, SQP is proceeding with the retrofit of it's toilets reducing their flow from 3.5 gal/flush to 1.9 gal/flush. In addition control of the number of flushes which average 44 flushes/day will be regulated to a maximum of 22 flushes/day.

There are a total of 2600 toilets that could use recycled water. Estimated water consumption for these toilets as part of a Phased approached to a recycled water expansion plan was set at 219.77 AF. As a conservation measure SQP purchased 1570 water saving flush valve kits. Installation of these valves began in late 2004 or early 2005.

Three calculations are provided to demonstrate the extent to which recycled water could still be used.

Estimated recycled water use at current level of water saving flush valve installation:

$$\frac{\text{1100 toilets @ 1.9 gal/flush @ 22 flushes/day X 365 days}}{\text{325,851 gal/acre foot}} = \textbf{50.51AF}$$

(23.43% reduction from CMSA Est.)

This leaves **196.34 AF** available for retrofit to recycled water

Estimated level of recycled water use if all purchased water saving flush valves were installed:

$$\frac{\text{1570 toilets @ 1.9 gal/flush @ 22 flushes/day X 365 days}}{\text{325,851 gal/acre foot}} = \textbf{73.51 AF}$$

(33.45 % reduction from CMSA Est.)

This leaves **146.26 AF** available for retrofit to recycled water

Estimated level of recycled water use if all toilets (2600) are equipped with water saving flush valves:

$$\frac{\text{2600 toilets @ 1.9 gal/flush @ 22 flushes/day X 365 days}}{\text{325,851 \textbf{gal/acre foot}}} = \textbf{121.74 AF}$$

(55.39 % reduction from CMSA Est.)

This leaves **98.03 AF** available for retrofit to recycled water

The laundry facilities, included in the CMSA estimate, have been calculated to use 16.3 AFY based on meter reading obtained from SQP in the mid-1990's.

Updated – May 2, 2007
File: G;/Expansion/CMSA/SQP Use Est 04.2007

APPENDIX E – POTENTIAL RECYCLED WATER CUSTOMER LIST

Table E - 1 All Potential Recycled Water Customers Considered in the Study
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand. AFY	Category
Landscape Irrigation				
1819127	1100 LARKSPUR LANDING CIR	Children's Hospital	2.6	Additional Irrigation Identified
2212047, 2273029, 2205021, 2212046, 2212044, 2212045, 2205023, 2205020		Larkspur Lands 001	18.6	Additional Irrigation Identified
45976	CANAL ST SR 94901		0.0	MMWD Irrigation Account
45987	197 NOVATO ST SR 94901		0.5	MMWD Irrigation Account
46017	KERNER BL SR 94901		1.3	MMWD Irrigation Account
46025	KERNER BL SR 94901		1.0	MMWD Irrigation Account
46028	KERNER BL SR 94901		1.9	MMWD Irrigation Account
46055	CATALINA BL SR 94901		0.0	MMWD Irrigation Account
50577	LARKSPUR ST SR 94901		0.2	MMWD Irrigation Account
50578	LARKSPUR ST SR 94901		1.2	MMWD Irrigation Account
51257	KERNER BL SR 94901		2.4	MMWD Irrigation Account
51880	BAHIA WY SR 94901		2.6	MMWD Irrigation Account
51882	BAHIA LN SR 94901		1.7	MMWD Irrigation Account
51883	BAHIA WY SR 94901		1.6	MMWD Irrigation Account
51884	BAHIA WY SR 94901		2.3	MMWD Irrigation Account
51885	BAHIA WY SR 94901		0.4	MMWD Irrigation Account
51886	BAHIA WY SR 94901		1.7	MMWD Irrigation Account
51887	BELLAM BL SR 94901		2.6	MMWD Irrigation Account
51888	VISTA DEL MAR SR 94901		1.3	MMWD Irrigation Account
51889	VISTA DEL MAR SR 94901		1.0	MMWD Irrigation Account
51890	VISTA DEL MAR SR 94901		2.9	MMWD Irrigation Account
51891	VISTA DEL MAR SR 94901		1.4	MMWD Irrigation Account
54860	PORTSMOUTH COVE SR 94901		0.5	MMWD Irrigation Account
35803	395 DOHERTY DR LK 94939		45.1	MMWD Irrigation Account
53309	599 WILLIAM AV LK 94939		0.1	MMWD Irrigation Account
54861	GLOUCESTER COVE SR 94901		2.9	MMWD Irrigation Account
55331	NARRAGANSETT COVE SR 94901		0.6	MMWD Irrigation Account
98070	CATALINA BL SR 94901		0.3	MMWD Irrigation Account
98071	CATALINA BL SR 94901		1.0	MMWD Irrigation Account
98072	CATALINA BL SR 94901		0.6	MMWD Irrigation Account
98073	CATALINA BL SR 94901		0.5	MMWD Irrigation Account
98075	CATALINA BL SR 94901		0.6	MMWD Irrigation Account
9925	2175 E FRANCISCO BL SR 94901		0.0	MMWD Irrigation Account
45881	990 E FRANCISCO BL SR 94901		0.9	MMWD Irrigation Account
54555	3230&3270 KERNER BL SR 94901		2.5	MMWD Irrigation Account
54839	25 PELICAN WY SR 94901		0.3	MMWD Irrigation Account
55261	E FRANCISCO BL SR 94901		0.0	MMWD Irrigation Account
56035	KERNER BL SR 94901		0.0	MMWD Irrigation Account
60924	103 SHORELINE PY SR 94901		0.9	MMWD Irrigation Account
60925	1599 E FRANCISCO BL SR 94901		3.8	MMWD Irrigation Account
60926	1599 E FRANCISCO BL SR 94901		1.5	MMWD Irrigation Account
60927	SHORELINE PY SR 94901		0.0	MMWD Irrigation Account
46500	E FRANCISCO BL SR 94901		0.0	MMWD Irrigation Account
53473	ANDERSEN DR SR 94901		0.0	MMWD Irrigation Account
53474	1271 ANDERSEN DR SR 94901		0.0	MMWD Irrigation Account
53653	3106 KERNER BL SR 94901		0.0	MMWD Irrigation Account
55270	BELLAM BL SR 94901		2.3	MMWD Irrigation Account
55271	BELLAM BL SR 94901		0.0	MMWD Irrigation Account
55617	1220 ANDERSEN DR SR 94901		0.3	MMWD Irrigation Account
59537	1151 ANDERSEN DR SR 94901		0.0	MMWD Irrigation Account
32386	E DRAKE BL LK 94939		0.0	MMWD Irrigation Account
55536	101 E DRAKE BL LK 94939		0.1	MMWD Irrigation Account
59517	5 DRAKE BL GB 94904		0.0	MMWD Irrigation Account
59518	E DRAKE BL LK 94939		0.0	MMWD Irrigation Account
98001	E DRAKE BL LK 94939		0.7	MMWD Irrigation Account
98002	LARK LNDG CI LK 94939		0.0	MMWD Irrigation Account
98004	60 E DRAKE BL LK 94939		0.0	MMWD Irrigation Account
98005	500 LARK LNDG CI LK 94939		0.4	MMWD Irrigation Account
98006	LARK LNDG CI LK 94939		0.7	MMWD Irrigation Account
98008	LARK LNDG CI LK 94939		3.2	MMWD Irrigation Account
98015	LARK LNDG CI LK 94939		3.2	MMWD Irrigation Account
98016	2200 LARK LNDG CI LK 94939		0.0	MMWD Irrigation Account
98018	101 LARK LNDG CI LK 94939		0.9	MMWD Irrigation Account
98021	E DRAKE BL LK 94939		1.8	MMWD Irrigation Account
98023	100 LARK LNDG CI LK 94939		0.0	MMWD Irrigation Account
98027	125 E DRAKE BL LK 94939		1.8	MMWD Irrigation Account
98060	17 E DRAKE BL LK 94939		0.7	MMWD Irrigation Account
98062	OLD QUARRY RD LK 94939		17.8	MMWD Irrigation Account
17549	MAGNOLIA AV LK 94939		1.2	MMWD Irrigation Account
20592	DOHERTY DR LK 94939		0.0	MMWD Irrigation Account
23927	552-556 MAGNOLIA AV LK 94939		0.5	MMWD Irrigation Account
36807	200 DOHERTY DR LK 94939		4.0	MMWD Irrigation Account
37059	W ROSE LN AND DOHERTY DR LK 94939		0.0	MMWD Irrigation Account
38426	205 TAMAL VISTA BL BLDG 5 CM 94925		0.0	MMWD Irrigation Account
42327	116-146 LARKSPUR PLAZA DR LK 94939		0.4	MMWD Irrigation Account
42330	LARKSPUR PLAZA DR LK 94939		2.7	MMWD Irrigation Account
42761	1 LARK PLAZA DR LK 94939		7.9	MMWD Irrigation Account
48253	250 DOHERTY DR LK 94939		39.1	MMWD Irrigation Account
49363	81 LUCKY DR CM 94925		0.9	MMWD Irrigation Account
50463	570 MAGNOLIA AV LK 94939		0.0	MMWD Irrigation Account
51016	BON AIR RD LK 94939		0.4	MMWD Irrigation Account
51017	MAGNOLIA AV LK 94939		0.2	MMWD Irrigation Account
53154	240 TAMAL VISTA BL CM 94925		1.4	MMWD Irrigation Account
53655	100 TAMAL VISTA BL CM 94925		1.6	MMWD Irrigation Account
53656	200 TAMAL VISTA BL CM 94925		2.6	MMWD Irrigation Account
53657	300 TAMAL VISTA BL CM 94925		2.6	MMWD Irrigation Account
53658	400 TAMAL VISTA BL CM 94925		0.9	MMWD Irrigation Account
53659	500 TAMAL VISTA BL CM 94925		0.8	MMWD Irrigation Account
54812	2 FIFER AV CM 94925		0.7	MMWD Irrigation Account
56256	100 LUCKY DR CM 94925		2.0	MMWD Irrigation Account
59224	44-46 LUCKY DR CM 94925		0.0	MMWD Irrigation Account
60802	WORNUM DR CM 94925		0.9	MMWD Irrigation Account

Table E - 1 All Potential Recycled Water Customers Considered in the Study
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand. AFY	Category
98057	CREEKSIDE DR LK 94939		5.6	MMWD Irrigation Account
98074	EDGEWATER PL LK 94939		1.4	MMWD Irrigation Account
06168			0.1	MMWD Irrigation Account
24995	ELISEO DR GB 94904		0.7	MMWD Irrigation Account
38884	15 BARRY WY GB 94904		0.3	MMWD Irrigation Account
55683	BON AIR SHP CTR GB 94904		0.5	MMWD Irrigation Account
55693	BON AIR SHP CTR GB 94904		3.8	MMWD Irrigation Account
56193	DRAKES VIEW CI GB 94904		8.2	MMWD Irrigation Account
56195	DRAKES LANDING RD GB 94904		0.0	MMWD Irrigation Account
56735	PARKSIDE WY GB 94904		3.5	MMWD Irrigation Account
56842	BARRY WY GB 94904		4.3	MMWD Irrigation Account
59072	BARRY WY GB 94904		4.5	MMWD Irrigation Account
56937	GREGORY PL GB 94904		0.4	MMWD Irrigation Account
56938	LADERMAN LN GB 94904		2.8	MMWD Irrigation Account
56939	LADERMAN LN GB 94904		3.1	MMWD Irrigation Account
56940	LADERMAN LN GB 94904		2.1	MMWD Irrigation Account
56941	LADERMAN LN GB 94904		1.5	MMWD Irrigation Account
60570	ELISEO DR GB 94904		0.2	MMWD Irrigation Account
20164	675 DRAKE BL KF 94904		2.6	MMWD Irrigation Account
23080	481 VIA HIDALGO GB 94904		1.6	MMWD Irrigation Account
23984	373 BON AIR RD KF 94904		0.2	MMWD Irrigation Account
29247	461 VIA HIDALGO GB 94904		1.2	MMWD Irrigation Account
29248	441 VIA HIDALGO GB 94904		1.8	MMWD Irrigation Account
29249	429 VIA HIDALGO GB 94904		1.3	MMWD Irrigation Account
31684	373 BON AIR RD KF 94904		0.1	MMWD Irrigation Account
37942	25 MC ALLISTER AV KF 94904		4.5	MMWD Irrigation Account
38919	213 LOWER VIA CASITAS GB 94904		1.0	MMWD Irrigation Account
38920	280 LOWER VIA CASITAS GB 94904		0.4	MMWD Irrigation Account
38930	52 LOWER VIA CASITAS GB 94904		1.1	MMWD Irrigation Account
38931	20 LOWER VIA CASITAS GB 94904		1.0	MMWD Irrigation Account
38932	400 S ELISEO DR GB 94904		0.5	MMWD Irrigation Account
38933	365 VIA CASITAS GB 94904		2.3	MMWD Irrigation Account
38936	50 VIA BELARDO GB 94904		1.8	MMWD Irrigation Account
38940	290 VIA CASITAS GB 94904		1.4	MMWD Irrigation Account
38942	320 VIA CASITAS GB 94904		2.1	MMWD Irrigation Account
38944	362 VIA CASITAS GB 94904		1.5	MMWD Irrigation Account
41521	175 UPPER VIA CASITAS GB 94904		2.3	MMWD Irrigation Account
41522	151 UPPER VIA CASITAS GB 94904		0.0	MMWD Irrigation Account
41530	515-545 S ELISEO DR GB 94904		0.0	MMWD Irrigation Account
41532	557 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
41534	S ELISEO DR GB 94904		0.5	MMWD Irrigation Account
43863	677-687 S ELISEO DR GB 94904		0.4	MMWD Irrigation Account
43864	689-695 S ELISEO DR GB 94904		0.5	MMWD Irrigation Account
43866	499 VIA CASITAS GB 94904		2.7	MMWD Irrigation Account
43944	599 DRAKE BL GB 94904		1.7	MMWD Irrigation Account
43961	450 S ELISEO DR GB 94904		0.7	MMWD Irrigation Account
45238	BON AIR RD KF 94904		0.0	MMWD Irrigation Account
45242	1300 S ELISEO DR GB 94904		1.3	MMWD Irrigation Account
45243	1240 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
45244	1220 S ELISEO DR GB 94904		3.5	MMWD Irrigation Account
48567	1350 S ELISEO DR GB 94904		5.3	MMWD Irrigation Account
59337	BON AIR RD GB 94904		0.0	MMWD Irrigation Account
45245	1375 S ELISEO DR GB 94904		0.0	MMWD Irrigation Account
46754	565 VIA CASITAS GB 94904		0.1	MMWD Irrigation Account
47354	1375 S ELISEO DR GB 94904		0.1	MMWD Irrigation Account
47902	2 BON AIR RD LK 94939		2.4	MMWD Irrigation Account
47944	1331 S ELISEO DR GB 94904		0.5	MMWD Irrigation Account
48562	1363 S ELISEO DR GB 94904		0.1	MMWD Irrigation Account
49234	1251 S ELISEO DR GB 94904		0.1	MMWD Irrigation Account
49423	1321 S ELISEO DR GB 94904		0.9	MMWD Irrigation Account
49501	30 VIA HOLON GB 94904		1.1	MMWD Irrigation Account
49502	66 VIA HOLON GB 94904		1.1	MMWD Irrigation Account
49864	1125 S ELISEO DR GB 94904		1.2	MMWD Irrigation Account
49865	1125 S ELISEO DR GB 94904		0.7	MMWD Irrigation Account
49866	1105 S ELISEO DR GB 94904		1.2	MMWD Irrigation Account
49867	1075 S ELISEO DR GB 94904		0.7	MMWD Irrigation Account
49868	1055 S ELISEO DR GB 94904		0.7	MMWD Irrigation Account
49872	955 S ELISEO DR GB 94904		1.2	MMWD Irrigation Account
49874	901-951 S ELISEO DR GB 94904		1.8	MMWD Irrigation Account
49875	875 S ELISEO DR GB 94904		0.8	MMWD Irrigation Account
49876	833 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
49877	825 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
49878	805 S ELISEO DR GB 94904		0.2	MMWD Irrigation Account
49879	775 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
49880	755 S ELISEO DR GB 94904		0.4	MMWD Irrigation Account
49881	725 S ELISEO DR GB 94904		0.6	MMWD Irrigation Account
49882	705 S ELISEO DR GB 94904		0.8	MMWD Irrigation Account
49883	850 S ELISEO DR GB 94904		1.5	MMWD Irrigation Account
49885	12-28 CORTE REAL GB 94904		1.8	MMWD Irrigation Account
49886	30 CORTE REAL GB 94904		0.6	MMWD Irrigation Account
49887	40 CORTE REAL GB 94904		0.7	MMWD Irrigation Account
49888	50 CORTE REAL GB 94904		0.9	MMWD Irrigation Account
49889	60 CORTE REAL GB 94904		0.7	MMWD Irrigation Account
49890	70 CORTE REAL GB 94904		0.5	MMWD Irrigation Account
49893	45 CORTE REAL GB 94904		0.7	MMWD Irrigation Account
49894	45 CORTE REAL GB 94904		1.2	MMWD Irrigation Account
49895	900 S ELISEO DR GB 94904		0.9	MMWD Irrigation Account
49897	1000 S ELISEO DR GB 94904		1.6	MMWD Irrigation Account
49899	1100 S ELISEO DR GB 94904		0.1	MMWD Irrigation Account
49900	1100 S ELISEO DR GB 94904		1.6	MMWD Irrigation Account
50888	55 CORTE REAL GB 94904		0.3	MMWD Irrigation Account
50890	55 CORTE REAL GB 94904		0.2	MMWD Irrigation Account
51074	235 BON AIR RD KF 94904		4.1	MMWD Irrigation Account
52318	S ELISEO DR GB 94904		0.6	MMWD Irrigation Account

Table E - 1 All Potential Recycled Water Customers Considered in the Study
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand. AFY	Category
52493	CORTE ORIENTAL GB 94904		1.0	MMWD Irrigation Account
54148	BON AIR RD KF 94904		4.5	MMWD Irrigation Account
56211	1341 S ELISEO DR GB 94904		1.0	MMWD Irrigation Account
57733	630 S ELISEO DR GB 94904		0.0	MMWD Irrigation Account
479	DRAKE BL KF 94904		1.1	MMWD Irrigation Account
38407	800 COLLEGE AV KF 94904		4.4	MMWD Irrigation Account
43874	COLLEGE AV KF 94904		27.5	MMWD Irrigation Account
40134	COLLEGE AV KF 94904		0.2	MMWD Irrigation Account
50545	MAGNOLIA AV LK 94939		0.0	MMWD Irrigation Account
50982	SKYLARK DR LK 94939		0.2	MMWD Irrigation Account
50993	555 BROWNING ST MV 94941		0.1	MMWD Irrigation Account
51014	MAGNOLIA AV LK 94939		0.0	MMWD Irrigation Account
51015	MAGNOLIA AV LK 94939		0.0	MMWD Irrigation Account
51024	STADIUM WY KF 94904		0.1	MMWD Irrigation Account
54772	1126 MAGNOLIA AV LK 94939		6.2	MMWD Irrigation Account
Commercial Users				
7410102	735 COLLEGE AVE	Kentwoodlands Shopping Center	0.44	Cooling Tower
1805120	75 BELLAM BLVD	Marin Square Shopping Center	1.41	Cooling Tower
809124	26 MEDWAY RD	Harbor Shopping Center	0.21	Cooling Tower
1806254	10 BELLAM BLVD	Bellam Plaza Shopping Center	0.15	Cooling Tower
7114420	1004 SIR FRANCIS DRAKE BLVD	Fire Station	0.15	Cooling Tower
7411508, 2201035		Marin Catholic High School	2.42	Cooling Tower
1819104, 1819101		Larkspur Landing Shopping Center	3.14	Cooling Tower
2204030, 2204040, 2204044, 2204037, 2204045, 2204003, 2204038, 2204036		Bon Air Shopping Center	2.77	Cooling Tower
	56 MADERA BLVD	Marin Co-Op Shopping Center	0.89	Cooling Tower
02416305, 02416309, 02416304, 02416303, 02416310, 02416308, 02416306, 02416301		Town Center Corte Madera Shopping Center	5.65	Cooling Tower
928007	3230 KERNER BLVD	Marin Community Clinic (Marin Health and Wellness Campus)	1.21	Cooling Tower
912104	3110 KERNER BLVD	Marin Community Clinic	0.43	Cooling Tower
902206	125 BAHIA WAY	Bahia Vista Elementary School	0.49	Cooling Tower
2212011	200 DOHERTY DR	Hall Middle School	1.10	Cooling Tower
2401166	240 TAMAL VISTA BLVD	American Associates Ben Gurion University	0.33	Cooling Tower
1819127	1100 LARKSPUR LANDING CIR	Children's Hospital	0.50	Cooling Tower
7405217, 7405218		Anthony G Bacich Elementary School	1.19	Cooling Tower
2212042, 2212039, 2401158, 2212008		Redwood High School, Tamiscal High School, San Andreas High School, Mewah Mountain Opportunity High School, Tamalpais High School	4.18	Cooling Tower
2003510, 7410206, 7410219, 2002014, 2002010, 2002007, 7410220, 2002003		A E Kent Middle School	2.95	Cooling Tower
2221123, 2221124, 2221117, 2221121, 2207501, 2221110, 2206020, 2221111, 2221122, 2201034, 2221102, 2221103, 2221101		Marin General Hospital	1.89	Cooling Tower
7402211, 7402213, 7402214, 7402205, 7409310, 7409308, 7402224, 7402215, 7409304, 7402210, 7402216, 7402101, 7402203, 7402222, 7402217, 7402218, 7402223, 7402204, 7409309, 7402219, 7402212, 7402221, 7402225, 7402202, 7402201		College of Marin Kentfield Campus	4.41	Cooling Tower
1806249	20 BELLAM BLVD	Spotless Car Wash	3.8	Car Wash
810301	990 FRANCISCO BLVD E	Royal Coach Car Wash	3.8	Car Wash
		Marin Sanitary Service	0.64	Operational Uses
		Vactor Truck Filling	0.52	Operational Uses
San Quentin Prison				
48155		San Quentin	16.4	MMWD Irrigation Account
		San Quentin	14.3	Boiler
		San Quentin	122	Dual Flush
		San Quentin	0.1	Car Wash

Table E-2	Potential Recycled Water Customers - Alternative 1A and 1B Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand, AFY**	**Category**	**Type**
San Quentin Uses					
SV-48155	HY 580 SQ PRISON SQ 94964		16.4	Irrigation	Irrigation
		San Quentin Boiler	14.3	Boiler	Other
		San Quentin Dual Flush	121.7	Dual Flush	Other
		San Quentin Car Wash	0.1	Car Wash	Commercial
Total Demand			**152.5**		

Table E-3	Potential Recycled Water Customers - Alternative 2A Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand. AFY**	**Category**	**Type**
CMSA North					
	125 BAHIA WAY	Bahia Vista Elementary School	0.49	Cooling	Commercial
	3230 KERNER BLVD	Marin Community Clinic (Marin Health and Wellness Campus)	1.21	Cooling	Commercial
	75 BELLAM BLVD	Marin Square Shopping Center	1.41	Cooling	Commercial
	20 BELLAM BLVD	Spotless Car Wash	3.8	Car Wash	Commercial
	10 BELLAM BLVD	Bellam Plaza Shopping Center	0.15	Cooling	Commercial
	990 FRANCISCO BLVD E	Royal Coach Car Wash	3.8	Car Wash	Commercial
SV-51880	BAHIA WY SR 94901		2.6	Irrigation	Irrigation
SV-51257	KERNER BL SR 94901		2.4	Irrigation	Irrigation
SV-51882	BAHIA LN SR 94901		1.7	Irrigation	Irrigation
SV-46028	KERNER BL SR 94901		1.9	Irrigation	Irrigation
SV-51883	BAHIA WY SR 94901		1.6	Irrigation	Irrigation
SV-51884	BAHIA WY SR 94901		2.3	Irrigation	Irrigation
SV-46025	KERNER BL SR 94901		1	Irrigation	Irrigation
SV-51886	BAHIA WY SR 94901		1.7	Irrigation	Irrigation
SV-51885	BAHIA WY SR 94901		0.4	Irrigation	Irrigation
SV-51889	VISTA DEL MAR SR 94901		1	Irrigation	Irrigation
SV-51891	VISTA DEL MAR SR 94901		1.4	Irrigation	Irrigation
SV-51890	VISTA DEL MAR SR 94901		2.9	Irrigation	Irrigation
SV-51888	VISTA DEL MAR SR 94901		1.3	Irrigation	Irrigation
SV-46017	KERNER BL SR 94901		1.3	Irrigation	Irrigation
SV-51887	BELLAM BL SR 94901		2.6	Irrigation	Irrigation
SV-55270	BELLAM BL SR 94901		2.3	Irrigation	Irrigation
SV-55617	1220 ANDERSEN DR SR 94901		0.3	Irrigation	Irrigation
SV-54555	3230&3270 KERNER BL SR 94901		2.5	Irrigation	Irrigation
SV-45881	990 E FRANCISCO BL SR 94901		0.9	Irrigation	Irrigation
Subtotal			***43.0***		
Uses at CMSA[(1)]					
	CMSA	Vactor Truck Filling	*0.5*	Other	Other
	CMSA	Marin Sanitary Service	*0.6*	Other	Other
Subtotal			***1.2***		
Total Demand			**44.1**		

Notes:
(1) These uses will not require additional piping as they assume recycled water will be taken directly from CMSA. These users

Table E-4	Potential Recycled Water Customers - Alternative 2B Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand, AFY**	**Category**	**Type**
Phase 1 - Marin County Mart					
		Larkspur Landing Shopping Center	3.1	Cooling	Commercial
SV-98062	OLD QUARRY RD LK 94939		17.8	Irrigation	Irrigation
SV-98008	LARK LNDG CI LK 94939		3.2	Irrigation	Irrigation
SV-98015	LARK LNDG CI LK 94939		3.2	Irrigation	Irrigation
SV-98021	E DRAKE BL LK 94939		1.8	Irrigation	Irrigation
SV-55536	101 E DRAKE BL LK 94939		0.1	Irrigation	Irrigation
SV-98027	125 E DRAKE BL LK 94939		1.8	Irrigation	Irrigation
SV-98006	LARK LNDG CI LK 94939		0.7	Irrigation	Irrigation
SV-98005	500 LARK LNDG CI LK 94939		0.4	Irrigation	Irrigation
SV-98018	101 LARK LNDG CI LK 94939		0.9	Irrigation	Irrigation
SV-98001	E DRAKE BL LK 94939		0.7	Irrigation	Irrigation
SV-60570	ELISEO DR GB 94904		0.2	Irrigation	Irrigation
SV-56735	PARKSIDE WY GB 94904		3.5	Irrigation	Irrigation
SV-24995	ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-98060	17 E DRAKE BL LK 94939		0.7	Irrigation	Irrigation
Subtotal - Phase 1			***38.8***		
Phase 2 - Greenbrae Area					
		Bon Air Shopping Center	2.8	Cooling	Commercial
		Larkspur Lands 001	18.6	itional Irriga	Irrigation
SV-38944	362 VIA CASITAS GB 94904		1.5	Irrigation	Irrigation
SV-38933	365 VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-38942	320 VIA CASITAS GB 94904		2.1	Irrigation	Irrigation
SV-38940	290 VIA CASITAS GB 94904		1.4	Irrigation	Irrigation
SV-38920	280 LOWER VIA CASITAS GB 94904		0.4	Irrigation	Irrigation
SV-43866	499 VIA CASITAS GB 94904		2.7	Irrigation	Irrigation
SV-46754	565 VIA CASITAS GB 94904		0.1	Irrigation	Irrigation
SV-41521	175 UPPER VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-49502	66 VIA HOLON GB 94904		1.1	Irrigation	Irrigation
SV-49501	30 VIA HOLON GB 94904		1.1	Irrigation	Irrigation
SV-49889	60 CORTE REAL GB 94904		0.7	Irrigation	Irrigation
SV-47354	1375 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49888	50 CORTE REAL GB 94904		0.9	Irrigation	Irrigation
SV-49890	70 CORTE REAL GB 94904		0.5	Irrigation	Irrigation
SV-48562	1363 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49887	40 CORTE REAL GB 94904		0.7	Irrigation	Irrigation
SV-38884	15 BARRY WY GB 94904		0.3	Irrigation	Irrigation
SV-56211	1341 S ELISEO DR GB 94904		1.0	Irrigation	Irrigation
SV-43961	450 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-50890	55 CORTE REAL GB 94904		0.2	Irrigation	Irrigation
SV-50888	55 CORTE REAL GB 94904		0.3	Irrigation	Irrigation
SV-43863	677-687 S ELISEO DR GB 94904		0.4	Irrigation	Irrigation
SV-38931	20 LOWER VIA CASITAS GB 94904		1.0	Irrigation	Irrigation
SV-38932	400 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49894	45 CORTE REAL GB 94904		1.2	Irrigation	Irrigation
SV-43864	689-695 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49886	30 CORTE REAL GB 94904		0.6	Irrigation	Irrigation
SV-45242	1300 S ELISEO DR GB 94904		1.3	Irrigation	Irrigation
SV-49893	45 CORTE REAL GB 94904		0.7	Irrigation	Irrigation

Table E-4	Potential Recycled Water Customers - Alternative 2B Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
SV-47944	1331 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49423	1321 S ELISEO DR GB 94904		0.9	Irrigation	Irrigation
SV-49882	705 S ELISEO DR GB 94904		0.8	Irrigation	Irrigation
SV-49885	12-28 CORTE REAL GB 94904		1.8	Irrigation	Irrigation
SV-45243	1240 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49881	725 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49234	1251 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49880	755 S ELISEO DR GB 94904		0.4	Irrigation	Irrigation
SV-45244	1220 S ELISEO DR GB 94904		3.5	Irrigation	Irrigation
SV-49895	900 S ELISEO DR GB 94904		0.9	Irrigation	Irrigation
SV-49883	850 S ELISEO DR GB 94904		1.5	Irrigation	Irrigation
SV-49879	775 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49878	805 S ELISEO DR GB 94904		0.2	Irrigation	Irrigation
SV-49864	1125 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-49900	1100 S ELISEO DR GB 94904		1.6	Irrigation	Irrigation
SV-49865	1125 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49899	1100 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49876	833 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49866	1105 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-49867	1075 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49897	1000 S ELISEO DR GB 94904		1.6	Irrigation	Irrigation
SV-49875	875 S ELISEO DR GB 94904		0.8	Irrigation	Irrigation
SV-49868	1055 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49874	901-951 S ELISEO DR GB 94904		1.8	Irrigation	Irrigation
SV-49872	955 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-52493	CORTE ORIENTAL GB 94904		1.0	Irrigation	Irrigation
SV-55693	BON AIR SHP CTR GB 94904		3.8	Irrigation	Irrigation
SV-56940	LADERMAN LN GB 94904		2.1	Irrigation	Irrigation
SV-52318	S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-56938	LADERMAN LN GB 94904		2.8	Irrigation	Irrigation
SV-49877	825 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-56842	BARRY WY GB 94904		4.3	Irrigation	Irrigation
SV-59072	BARRY WY GB 94904		4.5	Irrigation	Irrigation
SV-56941	LADERMAN LN GB 94904		1.5	Irrigation	Irrigation
SV-56939	LADERMAN LN GB 94904		3.1	Irrigation	Irrigation
SV-56193	DRAKES VIEW CI GB 94904		8.2	Irrigation	Irrigation
SV-55683	BON AIR SHP CTR GB 94904		0.5	Irrigation	Irrigation
Subtotal - Phase 2			***105.7***		
Phase 3 - Kentfield Area					
	735 COLLEGE AVE	Kentwoodlands Shopping Center	0.4	Cooling	Commercial
		Marin Catholic High School	2.4	Cooling	Commercial
		Anthony G Bacich Elementary School	1.2	Cooling	Commercial
		A E Kent Middle School	3.0	Cooling	Commercial
		Marin General Hospital	1.9	Cooling	Commercial
		College of Marin Kentfield Campus	4.4	Cooling	Commercial
SV-54772	1126 MAGNOLIA AV LK 94939		6.2	Irrigation	Irrigation
SV-37942	25 MC ALLISTER AV KF 94904		4.5	Irrigation	Irrigation
SV-20164	675 DRAKE BL KF 94904		2.6	Irrigation	Irrigation
SV-31684	373 BON AIR RD KF 94904		0.1	Irrigation	Irrigation
SV-23984	373 BON AIR RD KF 94904		0.2	Irrigation	Irrigation
SV-43944	599 DRAKE BL GB 94904		1.7	Irrigation	Irrigation
SV-23080	481 VIA HIDALGO GB 94904		1.6	Irrigation	Irrigation
SV-51074	235 BON AIR RD KF 94904		4.1	Irrigation	Irrigation

Table E-4	Potential Recycled Water Customers - Alternative 2B Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
SV-29247	461 VIA HIDALGO GB 94904		1.2	Irrigation	Irrigation
SV-29248	441 VIA HIDALGO GB 94904		1.8	Irrigation	Irrigation
SV-29249	429 VIA HIDALGO GB 94904		1.3	Irrigation	Irrigation
SV-48567	1350 S ELISEO DR GB 94904		5.3	Irrigation	Irrigation
SV-38407	800 COLLEGE AV KF 94904		4.4	Irrigation	Irrigation
SV-40134	COLLEGE AV KF 94904		0.2	Irrigation	Irrigation
SV-51024	STADIUM WY KF 94904		0.1	Irrigation	Irrigation
SV-54148	BON AIR RD KF 94904		4.5	Irrigation	Irrigation
SV-43874	COLLEGE AV KF 94904		27.5	Irrigation	Irrigation
Subtotal - Phase 3			***80.6***		
Phase 4 - Doherty Drive					
	200 DOHERTY DR	Hall Middle School	1.1	Cooling	Commercial
		Redwood High School, Tamiscal High School, San Andreas High School, Mewah Mountain Opportunity High School, Tamalpais High School	4.2	Cooling	Commercial
SV-47902	2 BON AIR RD LK 94939		2.4	Irrigation	Irrigation
SV-98074	EDGEWATER PL LK 94939		1.4	Irrigation	Irrigation
SV-98057	CREEKSIDE DR LK 94939		5.6	Irrigation	Irrigation
SV-42327	116-146 LARKSPUR PLAZA DR LK 94939		0.4	Irrigation	Irrigation
SV-42761	1 LARK PLAZA DR LK 94939		7.9	Irrigation	Irrigation
SV-51017	MAGNOLIA AV LK 94939		0.2	Irrigation	Irrigation
SV-36807	200 DOHERTY DR LK 94939		4.0	Irrigation	Irrigation
SV-48253	250 DOHERTY DR LK 94939		39.1	Irrigation	Irrigation
SV-17549	MAGNOLIA AV LK 94939		1.2	Irrigation	Irrigation
SV-35803	395 DOHERTY DR LK 94939		45.1	Irrigation	Irrigation
SV-53309	599 WILLIAM AV LK 94939		0.1	Irrigation	Irrigation
SV-51016	BON AIR RD LK 94939		0.4	Irrigation	Irrigation
Subtotal - Phase 4			***113.1***		
Total Demand			**338.2**		

Table E-5 Potential Recycled Water Customers - Alternative 2C
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand, AFY	Category	Type
Marin County Mart Only					
		Larkspur Landing Shopping Center	3.1	Cooling	Commercial
SV-98062	OLD QUARRY RD LK 94939		17.8	Irrigation	Irrigation
SV-98008	LARK LNDG CI LK 94939		3.2	Irrigation	Irrigation
SV-98015	LARK LNDG CI LK 94939		3.2	Irrigation	Irrigation
SV-98021	E DRAKE BL LK 94939		1.8	Irrigation	Irrigation
SV-55536	101 E DRAKE BL LK 94939		0.1	Irrigation	Irrigation
SV-98027	125 E DRAKE BL LK 94939		1.8	Irrigation	Irrigation
SV-98006	LARK LNDG CI LK 94939		0.7	Irrigation	Irrigation
SV-98005	500 LARK LNDG CI LK 94939		0.4	Irrigation	Irrigation
SV-98018	101 LARK LNDG CI LK 94939		0.9	Irrigation	Irrigation
SV-98001	E DRAKE BL LK 94939		0.7	Irrigation	Irrigation
Subtotal			***33.7***		
Uses at CMSA(1)					
	CMSA	Vactor Truck Filling	*0.5*	Other	Other
	CMSA	Marin Sanitary Service	*0.6*	Other	Other
Subtotal			***1.2***		
Total Demand			**34.9**		

Notes:
(1) These uses will not require additional piping as they assume recycled water will be taken directly from CMSA. These users require

Table E-6 **Potential Recycled Water Customers - Alternative 3A**
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand, AFY	Category	Type
Kentfield Area					
	735 COLLEGE AVE	Kentwoodlands Shopping Center	0.4	Cooling	Commercial
		Marin Catholic High School	2.4	Cooling	Commercial
		Anthony G Bacich Elementary School	1.2	Cooling	Commercial
		A E Kent Middle School	3.0	Cooling	Commercial
		Marin General Hospital	1.9	Cooling	Commercial
		College of Marin Kentfield Campus	4.4	Cooling	Commercial
SV-54772	1126 MAGNOLIA AV LK 94939		6.2	Irrigation	Irrigation
SV-37942	25 MC ALLISTER AV KF 94904		4.5	Irrigation	Irrigation
SV-20164	675 DRAKE BL KF 94904		2.6	Irrigation	Irrigation
SV-31684	373 BON AIR RD KF 94904		0.1	Irrigation	Irrigation
SV-23984	373 BON AIR RD KF 94904		0.2	Irrigation	Irrigation
SV-43944	599 DRAKE BL GB 94904		1.7	Irrigation	Irrigation
SV-23080	481 VIA HIDALGO GB 94904		1.6	Irrigation	Irrigation
SV-51074	235 BON AIR RD KF 94904		4.1	Irrigation	Irrigation
SV-29247	461 VIA HIDALGO GB 94904		1.2	Irrigation	Irrigation
SV-29248	441 VIA HIDALGO GB 94904		1.8	Irrigation	Irrigation
SV-29249	429 VIA HIDALGO GB 94904		1.3	Irrigation	Irrigation
SV-48567	1350 S ELISEO DR GB 94904		5.3	Irrigation	Irrigation
SV-38407	800 COLLEGE AV KF 94904		4.4	Irrigation	Irrigation
SV-40134	COLLEGE AV KF 94904		0.2	Irrigation	Irrigation
SV-51024	STADIUM WY KF 94904		0.1	Irrigation	Irrigation
SV-54148	BON AIR RD KF 94904		4.5	Irrigation	Irrigation
SV-43874	COLLEGE AV KF 94904		27.5	Irrigation	Irrigation
Total Demand			**80.6**		

Table E-7	Potential Recycled Water Customers - Alternative 3B Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand, AFY**	**Category**	**Type**
Doherty Drive					
	200 DOHERTY DR	Hall Middle School	1.1	Cooling	Commercial
		Redwood High School, Tamiscal High School, San Andreas High School, Mewah Mountain Opportunity High School, Tamalpais High School	4.2	Cooling	Commercial
SV-47902	2 BON AIR RD LK 94939		2.4	Irrigation	Irrigation
SV-98074	EDGEWATER PL LK 94939		1.4	Irrigation	Irrigation
SV-98057	CREEKSIDE DR LK 94939		5.6	Irrigation	Irrigation
SV-42327	116-146 LARKSPUR PLAZA DR LK 94939		0.4	Irrigation	Irrigation
SV-42761	1 LARK PLAZA DR LK 94939		7.9	Irrigation	Irrigation
SV-51017	MAGNOLIA AV LK 94939		0.2	Irrigation	Irrigation
SV-36807	200 DOHERTY DR LK 94939		4.0	Irrigation	Irrigation
SV-48253	250 DOHERTY DR LK 94939		39.1	Irrigation	Irrigation
SV-17549	MAGNOLIA AV LK 94939		1.2	Irrigation	Irrigation
SV-35803	395 DOHERTY DR LK 94939		45.1	Irrigation	Irrigation
SV-53309	599 WILLIAM AV LK 94939		0.1	Irrigation	Irrigation
SV-51016	BON AIR RD LK 94939		0.4	Irrigation	Irrigation
Total Demand			**113.1**		

Table E-8 **Potential Recycled Water Customers - Alternative 3C**
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand, AFY	Category	Type
Greenbrae Area					
		Bon Air Shopping Center	2.8	Cooling	Commercial
		Larkspur Lands 001	18.6	Additional Irrigation	Irrigation
SV-38944	362 VIA CASITAS GB 94904		1.5	Irrigation	Irrigation
SV-38933	365 VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-38942	320 VIA CASITAS GB 94904		2.1	Irrigation	Irrigation
SV-38940	290 VIA CASITAS GB 94904		1.4	Irrigation	Irrigation
SV-38920	280 LOWER VIA CASITAS GB 94904		0.4	Irrigation	Irrigation
SV-43866	499 VIA CASITAS GB 94904		2.7	Irrigation	Irrigation
SV-46754	565 VIA CASITAS GB 94904		0.1	Irrigation	Irrigation
SV-41521	175 UPPER VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-49502	66 VIA HOLON GB 94904		1.1	Irrigation	Irrigation
SV-49501	30 VIA HOLON GB 94904		1.1	Irrigation	Irrigation
SV-49889	60 CORTE REAL GB 94904		0.7	Irrigation	Irrigation
SV-47354	1375 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49888	50 CORTE REAL GB 94904		0.9	Irrigation	Irrigation
SV-49890	70 CORTE REAL GB 94904		0.5	Irrigation	Irrigation
SV-48562	1363 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49887	40 CORTE REAL GB 94904		0.7	Irrigation	Irrigation
SV-38884	15 BARRY WY GB 94904		0.3	Irrigation	Irrigation
SV-56211	1341 S ELISEO DR GB 94904		1.0	Irrigation	Irrigation
SV-43961	450 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-50890	55 CORTE REAL GB 94904		0.2	Irrigation	Irrigation
SV-50888	55 CORTE REAL GB 94904		0.3	Irrigation	Irrigation
SV-43863	677-687 S ELISEO DR GB 94904		0.4	Irrigation	Irrigation
SV-38931	20 LOWER VIA CASITAS GB 94904		1.0	Irrigation	Irrigation
SV-38932	400 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49894	45 CORTE REAL GB 94904		1.2	Irrigation	Irrigation
SV-43864	689-695 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49886	30 CORTE REAL GB 94904		0.6	Irrigation	Irrigation
SV-45242	1300 S ELISEO DR GB 94904		1.3	Irrigation	Irrigation
SV-49893	45 CORTE REAL GB 94904		0.7	Irrigation	Irrigation
SV-47944	1331 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-49423	1321 S ELISEO DR GB 94904		0.9	Irrigation	Irrigation
SV-49882	705 S ELISEO DR GB 94904		0.8	Irrigation	Irrigation
SV-49885	12-28 CORTE REAL GB 94904		1.8	Irrigation	Irrigation
SV-45243	1240 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49881	725 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49234	1251 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49880	755 S ELISEO DR GB 94904		0.4	Irrigation	Irrigation
SV-45244	1220 S ELISEO DR GB 94904		3.5	Irrigation	Irrigation
SV-49895	900 S ELISEO DR GB 94904		0.9	Irrigation	Irrigation
SV-49883	850 S ELISEO DR GB 94904		1.5	Irrigation	Irrigation
SV-49879	775 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49878	805 S ELISEO DR GB 94904		0.2	Irrigation	Irrigation
SV-49864	1125 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-49900	1100 S ELISEO DR GB 94904		1.6	Irrigation	Irrigation
SV-49865	1125 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49899	1100 S ELISEO DR GB 94904		0.1	Irrigation	Irrigation
SV-49876	833 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-49866	1105 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-49867	1075 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49897	1000 S ELISEO DR GB 94904		1.6	Irrigation	Irrigation
SV-49875	875 S ELISEO DR GB 94904		0.8	Irrigation	Irrigation
SV-49868	1055 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-49874	901-951 S ELISEO DR GB 94904		1.8	Irrigation	Irrigation
SV-49872	955 S ELISEO DR GB 94904		1.2	Irrigation	Irrigation
SV-52493	CORTE ORIENTAL GB 94904		1.0	Irrigation	Irrigation
SV-55693	BON AIR SHP CTR GB 94904		3.8	Irrigation	Irrigation
SV-56940	LADERMAN LN GB 94904		2.1	Irrigation	Irrigation
SV-52318	S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-56938	LADERMAN LN GB 94904		2.8	Irrigation	Irrigation

Table E-8 Potential Recycled Water Customers - Alternative 3C
Recycled Water Feasibility Study
Central Marin Sanitation Agency/Marin Municipal Water District

Service	Street	Name	Potential RW Demand, AFY	Category	Type
SV-49877	825 S ELISEO DR GB 94904		0.6	Irrigation	Irrigation
SV-56842	BARRY WY GB 94904		4.3	Irrigation	Irrigation
SV-59072	BARRY WY GB 94904		4.5	Irrigation	Irrigation
SV-56941	LADERMAN LN GB 94904		1.5	Irrigation	Irrigation
SV-56939	LADERMAN LN GB 94904		3.1	Irrigation	Irrigation
SV-56193	DRAKES VIEW CI GB 94904		8.2	Irrigation	Irrigation
SV-55683	BON AIR SHP CTR GB 94904		0.5	Irrigation	Irrigation
Total Demand			**105.7**		

Table E-9	Potential Recycled Water Customers - Alternative 3D Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand, AFY**	**Category**	**Type**
Kentfield Select					
		Kentwoodlands Shopping Center	0.44	Commercial	Commercial
		A E Kent Middle School	2.95	Commercial	Commercial
SV-54772	1126 MAGNOLIA AV LK 94939		6.2	Irrigation	Irrigation
SV-38407	800 COLLEGE AV KF 94904		4.4	Irrigation	Irrigation
SV-40134	COLLEGE AV KF 94904		0.2	Irrigation	Irrigation
SV-43874	COLLEGE AV KF 94904		27.5	Irrigation	Irrigation
Total Demand			**41.7**		

Table E-10	Potential Recycled Water Customers - Alternative 3E Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District				
Service	**Street**	**Name**	**Potential RW Demand, AFY**	**Category**	**Type**
Greenbrae Select					
		Larkspur Lands 001	18.6	Irrigation	Irrigation
SV-38944	362 VIA CASITAS GB 94904		1.5	Irrigation	Irrigation
SV-38933	365 VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-38942	320 VIA CASITAS GB 94904		2.1	Irrigation	Irrigation
SV-38940	290 VIA CASITAS GB 94904		1.4	Irrigation	Irrigation
SV-38920	280 LOWER VIA CASITAS GB 94904		0.4	Irrigation	Irrigation
SV-41521	175 UPPER VIA CASITAS GB 94904		2.3	Irrigation	Irrigation
SV-43961	450 S ELISEO DR GB 94904		0.7	Irrigation	Irrigation
SV-38931	20 LOWER VIA CASITAS GB 94904		1	Irrigation	Irrigation
SV-38932	400 S ELISEO DR GB 94904		0.5	Irrigation	Irrigation
SV-56940	LADERMAN LN GB 94904		2.1	Irrigation	Irrigation
SV-56938	LADERMAN LN GB 94904		2.8	Irrigation	Irrigation
SV-56941	LADERMAN LN GB 94904		1.5	Irrigation	Irrigation
SV-56939	LADERMAN LN GB 94904		3.1	Irrigation	Irrigation
SV-56193	DRAKES VIEW CI GB 94904		8.2	Irrigation	Irrigation
Total Demand			**48.5**		

APPENDIX F – STAKEHOLDER LETTERS OF SUPPORT

STATE OF CALIFORNIA — DEPARTMENT OF CORRECTIONS AND REHABILITATION

EDMUND G. BROWN JR., GOVERNOR

FACILITY PLANNING, CONSTRUCTION AND MANAGEMENT

P.O. Box 942883
Sacramento, CA 94283-0001

June 9, 2015

Central Marin Sanitation Agency
Marin Municipal Water District

RE: Recycled Water Use for Irrigation or Commercial Purposes

To Whom It May Concern:

The California Department of Corrections and Rehabilitation (CDCR) wishes to express their support for the need for further development of recycled water supplies within the Central Marin area. The expansion of the recycled water system in the area will support green initiatives such as Executive Order B-29-15, sustainable values, and provide additional water supply for the area.

CDCR supports the effort of the Central Marin Sanitation Agency and the Marin Municipal Water District to bring this valuable resource to the community. As the recycled water program is developed, CDCR believes San Quentin State Prison can likely participate where economically feasible by replacing potable water with recycled water for irrigation, boiler use, and potentially in inmate housing areas for flushing toilets. CDCR believes we will benefit significantly with the use of recycled water.

Sincerely,

Jeff Henninger

Jeff Henninger
Chief of Energy and Sustainability Section
Facilities Asset Management Branch
Facility Planning, Construction and Maintenance Division
California Department of Corrections and Rehabilitation

STATE OF CALIFORNIA
GOVERNOR'S OFFICE *of* PLANNING AND RESEARCH

EDMOND G. BROWN JR.
GOVERNOR

KEN ALEX
DIRECTOR

June 11, 2015

Central Marin Sanitation Agency
Marin Municipal Water District

Re: Recycled Water Use

To Whom It May Concern:

The Governor's Office of Planning and Research (OPR) supports the efforts of the Central Marin Sanitation Agency and the Marin Municipal Water District to further develop recycled water supplies in the Central Marin area. Expansion of the recycled water system in the area will support the State Water Board's Recycled Water Policy goal of increasing use of recycled water by 1 million acre-feet per year by 2020 (from 2002 levels).

OPR is California's comprehensive state planning agency and serves the Governor and his Cabinet as staff for long-range planning and research. As such, OPR is working extensively on energy, water, and water-energy related issues.

OPR also supports efforts to bring recycled water to San Quentin State Prison, if economically feasible, to replace potable water with recycled water for irrigation, boiler use, and potentially for use in toilets in inmate housing areas. The use of recycled water at San Quentin State Prison will have significant benefits for the State, and, we believe, for the county.

Thank you for your consideration.

Sincerely,

Ken Alex
Director

1400 10th Street P.O. Box 3044 Sacramento, California 95812-3044
(916) 445-0613 FAX (916) 323-3018 www.opr.ca.gov

FACILITY PLANNING, CONSTRUCTION AND MANAGEMENT
P.O. Box 942883
Sacramento, CA 94283-0001

June 9, 2015

Central Marin Sanitation Agency
Marin Municipal Water District

RE: Recycled Water Use for Irrigation or Commercial Purposes

To Whom It May Concern:

San Quentin State Prison (San Quentin), part of the California Department of Corrections and Rehabilitation (CDCR), wishes to express their support for the need for further development of recycled water supplies within the Central Marin area. The expansion of the recycled water system in the area will support green initiatives such as Executive Order B-29-15, sustainable values, and provide additional water supply for the area.

San Quentin supports the effort of the Central Marin Sanitation Agency and the Marin Municipal Water District to bring this valuable resource to the community. As the recycled water program is developed, San Quentin can likely participate where economically feasible by replacing potable water with recycled water for irrigation, boiler use, and potentially in inmate housing areas for flushing toilets. San Quentin believes we will benefit significantly with the use of recycled water.

Sincerely,

Ron Davis
Warden (A)
San Quentin State Prison
California Department of Corrections and Rehabilitation

Marin Municipal Water District (MMWD) /
Central Marin Sanitation District (CMSA)

RECYCLED WATER FEASIBILITY STUDY

Meeting with San Quentin Prison/CDCR – Discuss Possible Delivery of Recycled Water to SQP

April 22, 2015 – 9:30 am - 11:30 am

1301 Anderson Drive, San Rafael

AGENDA

1. Introductions and roles
2. Present project background – scope and schedule
3. Present project status and findings to date
4. Present preliminary planning level cost estimates
5. Discuss construction aspects – off-site, on-site and interior of buildings
6. Discuss CDCR requirements and needs – materials, timing, construction, etc
7. Discuss possible funding and cost sharing concepts/considerations
8. Next Steps

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CMSA / MMWD

San Quentin Prison Mtg

Title
Work Order No.
Date 4-22-15
By
Page of

Name	Agency / Role	Phone
Tracy Clinton	Carollo - PM	(925) 932-1710
Elizabeth Jones	" - proj. eng.	"
Mike Warriner	Carollo - Construction Group	925-200-0675
Sandy Goldberg	Gov's Office of Planning	916-397-0409
MATT O'BYRNE	SAN QUENTIN	415 455 5078
Andy Crump	San Quentin	415-455-5079
JEFF HENNINGER	CDCR / CHIEF	916-225-2229
Jennifer Farrell	CDCR / analyst	916-255-1133
BRIAN THOMAS	CMSA	415-459-1455
Jason Dow	CMSA	"
PAUL SELLIER	MMWD	415-945-1577

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APPENDIX G – CHLORINE CONTACT RETROFIT

APPENDIX G – CHLORINE CONTACT RETROFIT

1.1 BACKGROUND

A preliminary analysis was conducted to determine if Central Marin Sanitation Agency (CMSA) could retrofit a couple of their existing chlorine contact tanks (CCTs) to produce Title 22 recycled water for a lower cost than constructing ultraviolet (UV) disinfection.

1.1.1 Title 22 Disinfection Requirements

In order to produce recycled water for irrigation, car washes, cooling towers, and dual plumbing facilities, disinfection is required. For chlorine disinfection, a CT value (the product of chlorine concentration and contact time) of at least 450 milligram-minutes per liter (mg-min/L) is required. Additionally, a modal contact time of at least 90 minutes is also needed. This analysis looks at CMSA's existing CCTs to determine if there is sufficient capacity to meet these disinfection requirements for the proposed recycled water capacity.

1.1.2 Existing Chlorine Contact Tank Configuration

Currently, CMSA has six (6) CCTs. Four (4) of these CCTs (No. 1 to 4) were constructed in 1982 and are straight, parallel channels. Under average operating conditions, only these four CCTs are in service. CMSA also has two (2) additional serpentine CCTs (No. 5 and 6) constructed in 2007 located to the southwest of the original four CCTs. These newer CCTs are typically only operated during peak wet weather flows. At the CCT influent structure, flow can be routed to either the older four CCTs or to a channel which flows to the newer two CCTs. CCT effluent is combined before it either flows by gravity or is pumped to the ocean outfall.

1.1.3 Proposed Retrofits

A retrofit of the newer two CCTs (No. 5 and 6) was considered in this analysis since they are more easily isolated and are only used for wet weather flows. Since the proposed filtration facility for recycled water would be constructed to the northeast of the older four CCTs, a pipe would be needed to convey filtered recycled water to the influent channel of CCT No. 5 and 6. An additional pipe would also be needed to route disinfected recycled water from the CCT effluent channel to the recycled water pump station. This recycled water pump station would also be located next to the recycled water filtration facility. An estimated 650 feet of 8 inch piping each way would be needed.

Additionally, both the influent and effluent channel of CCT No. 5 and 6 would need to be retrofit in order to isolate CCT No. 5 and 6 from CCT No. 1 to 4 when they are used for recycled water production. This retrofit would need to allow for both isolation during recycled water production and reintegration for peak wet weather flows. It was assumed that recycled water would not be produced when CCT No. 5 and 6 are needed for wet weather disinfection. More study is needed to determine the exact influent and effluent channel retrofit requirements.

In this analysis, it is assumed that the existing chlorine dosing system has sufficient capacity to feed the recycled water flows; however, this would need to be verified in the next phase of work.

1.1.3.1 Disinfection

Existing and projected CMSA wastewater flows and estimated recycled water flows were used to determine if sufficient disinfection time could be provided with the retrofit described above. Table G.1 shows the predicted detention time for three cases: 1) existing CMSA wastewater flows using only CCT No. 1 to 4, 2) projected future CMSA wastewater flows using only CCT No, 1 to 4, and 3) recycled water flows using both CCT No. 5 and 6. In all cases there is sufficient detention time.

Table G.1 Calculated Detention Times
Recycled Water Feasibility Study
Marin Municipal Water District / Central Marin Sanitation Agency

Scenario Considered	CCT # in service	ADMMF(2)		PHF (dry weather)(3)		Needed Detention Time (min)
		Flow (mgd)	Detention Time (min)	Flow (mgd)	Detention Time (min)	
CMSA Effluent - EXISTING	1,2,3,4	16.5(1)	59	14.6(1)	66	30-60(6)
CMSA Effluent - FUTURE	1,2,3,4	17.5(1)	55	16.5(1)	59	30-60(6)
Recycled Water	5,6	0.15(4)	3232	0.2(4)(5)	2424	90(7)(8)

Notes:
(1) Based on flows outlined in Chapter 3.
(2) ADMMF = Average Day Maximum Month Flow.
(3) PHF = Peak Hour Flow.
(4) Flow based on flow needed to supply San Quentin Prison only, as these are the only alternatives considered where chlorine disinfection would be used.
(5) Max Day flow was used for recycled water because that is largest flow that will pass through the treatment train.
(5) Based on MOP-8 typical values.
(6) Based on Title 22 requirements for recycled water. In addition, to a modal contact time of 90 minutes a CT value of 450 mg-min/L is also required. This can be achieved with the right chlorine dosage.
(7) Because the calculated detention times are so much longer than 90 minutes, it is likely possible to use only one CCT or to produce a much larger quantity of recycled water.

1.1.3.2 Cost

A preliminary cost estimate for this CCT retrofit was developed and is shown in Table G.2. This cost estimate should be refined as more details are determined about the modifications needed for the influent and effluent CCT structures. This preliminary cost is less than the costs developed for implementing a UV disinfection facility shown in Table G.3 and thus, CCT disinfection is considered further in this recycled water feasibility study.

Table G.2 Preliminary Cost Estimate for CCT Retrofit
Recycled Water Feasibility Study
Marin Municipal Water District/Central Marin Sanitation Agency

Description	Quantity	Unit	Unit Cost	Total Cost
Piping from filtration to CCT and back (8" pipe assumed)	1300	LF	$ 156	$ 202,209
Connection Retrofit Cost (at influent and effluent structure)	2	EA	$ 100,000	$ 200,000
Subtotal				**$ 402,209**
Sitework	15%			$ 60,331
Total Direct Cost				**$ 460,000**
Construction and Estimating Contingency	40%			$ 184,000
Total Construction Cost				**$ 644,000**
Engineering, Legal, Administrative & Project	25%			$ 161,000
Total Project Cost				**$ 805,000**

Table G.3 Preliminary Cost Estimate for UV Disinfection
Recycled Water Feasibility Study
Marin Municipal Water District / Central Marin Sanitation Agency

Description	Quantity	Unit	Unit Cost	Total Cost
UV Disinfection	237911.1	gpd	$ 3	$ 720,222
Total Direct Cost				**$ 720,000**
Construction and Estimating Contingency	40%			$ 288,000
Total Construction Cost				**$1,008,000**
Engineering, Legal, Administrative & Project	25%			$ 252,000
Total Project Cost				**$1,260,000**

APPENDIX H – BASIS OF COST

APPENDIX H – BASIS OF COST

The basis of cost estimates for this alternatives analysis were based on planning level conceptual alternative configurations. Construction costs were estimated using unit costs developed from past construction contracts, estimating guides, unit prices, and construction costs of similar facilities and configurations at other locations. Using these sources, Bay Area adjusted capital costs were developed.

Construction costs have historically escalated with time. This trend is expected to continue in the future. To record these trends in rising costs, several indices have been established for various fields of construction. The standard indicator of changes in heavy construction prices is the Construction Cost Index (ENRCCI). Capital costs for the alternative analysis are based on July 2015 San Francisco ENRCCI of 11,155.

For the alternatives presented herein, cost estimates were developed following the Association for the Advancement of Cost Estimating (AACE) International Recommended Practice No. 18R-97 estimate class 5. Class 5 estimates are prepared for any number of strategic business planning purposes, including, but not limited to, project screening, evaluation of resource needs and budgeting, and long-range capital planning. Very limited information is typically available at the time a Class 5 estimate is developed. Therefore, Class 5 estimates virtually always use stochastic estimating methods such as cost to capacity curves and various scaling factors. Subsequently, estimated costs have wide accuracy range. Typical accuracy ranges for Class 5 estimates are -20 percent to -50 percent on the low side, and +30 percent to +100 percent on the high side, depending on the technological complexity of the project, availability and accuracy of appropriate reference information, and the inclusion of an appropriate contingency determination.

Project delivery factors are applied to construction cost estimates to account for the cost of engineering, legal, and administrative costs. Estimating contingencies and project delivery cost applied to the cost estimates are presented in Table H-1.

Unit costs for pipeline and pump station is included in Table H-2. Unit operations and maintenance costs are shown in Table H-3. This unit costs were used to derive O&M costs for the alternatives analysis and recommended project costs.

Table H-1	**Basis of Estimating Project (or Capital) Costs Recycled Water Feasibility Study Central Marin Sanitation Agency/Marin Municipal Water District**
Item	**Estimated Cost**
Direct Cost[1]	"A"
Subtotal Direct Cost	**"A"**
Construction and Estimating Contingency	+ 40% of "A"
Total Estimated Construction Cost	**"B"**
Engineering, Legal, and Administrative Fees	+ 25% of "B"
Total Project Cost [2]	**"C"**

Notes:
(1) Based on preliminary quantity takeoffs, estimating guides, and construction costs of similar facilities.
(2) Includes project contingencies, construction management, administrative, engineering, and legal costs.

Table H-2	**Unit Costs for Pipelines/Pump Stations Recycled Water Feasibility Study Sewerage Agency of Southern Marin/Marin Municipal Water District**
Pipe Diameter	**Unit Cost**
Pipe Diameter	
6"	$134 / lf
8"	$156 / lf
10"	$179 / lf
12"	$193 / lf
Pump Station	
< 100 hp	$10,410 / hp
100 – 500 hp	$7,860 / hp
Storage Tanks	
<1/4 MG	$1/gallon
>1/4 MG	$0.75/gallon

Table H-3 Unit Operations and Maintenance Costs Recycled Water Feasibility Study Sewerage Agency of Southern Marin/ Marin Municipal Water District	
Item	**Unit Cost**
Labor	$45 per person per hour
Annual Pipeline Maintenance	0.5% of Capital
Annual Pump Station Maintenance	1.0% of Capital
Power	$0.12 per kilowatt hour
Chemicals	
Alum	$9 per gallon
Polymer	$2 per gallon
Sodium Hypochlorite	$0.5 per gallon

1.1.1 Life Cycle Cost and Economic Analysis

In the evaluation of conceptual alternatives, total annual costs were based on the following:

- **Annual Cost.** Annual cost represents the combined capital and O&M costs on an annual basis. Capital costs are amortized over a 30-year period using an interest rate of 1.0 percent. Total annual cost is the sum of the amortized capital cost and the annual O&M cost.

The economic criteria used in the development of annual life-cycle costs are summarized in Table H-4.

Table H-4 Economic Criteria Used in Development of Costs Recycled Water Feasibility Study Sewerage Agency of Southern Marin/ Marin Municipal Water District	
Item	**Assumption**
Costs in Time and Place	Costs are based on July 2015 costs in San Francisco, California
Interest Rate	1.0 percent for amortization purpose
Amortization Period	30 years

APPENDIX I – DETAILED COST ESTIMATES

Subject: **Conceptual Alternative Analysis** Updated: 9/28/2015
Project: Recycled Water Feasibility Study
Client: Central Marin Sanitation Agency/Marin Municipal Water District

		Prison Alternatives			Centralized Treatment Alternatives						Satellite Treatment Alternatives					DPR		
		Alternative 1A	Alternative 1B	Alternative 1C	Alternative 2A	Alternative 2B - Phase 1	Alternative 2B - Phase 2	Alternative 2B - Phase 3	Alternative 2B - Phase 4	Alternative 2C	Alternative 3A	Alternative 3B	Alternative 3C	Alternative 3D	Alternative 3E	Alternative 4A	Alternative 4B	Alternative 4C
		Prison with Tertiary Filtration	Prison With MF	Prison With MF/RO	CMSA North	Marin County Mart	Greenbrae	Kentfield	Doherty Drive	Marin County Mart Only	Kentfield Area	Greenbrae Area	Doherty Area	Kentfield Select	Greenbrae Select	DPR (SQP Only)	DPR (2 mgd)	DPR (5 mgd)
Treatment Cost[1]		$1,233,000	$2,248,000	$3,255,000	$1,872,000	$1,797,000	$4,992,000	$3,606,000	$5,300,000	$1,571,000	$3,974,000	$5,501,000	$5,841,000	$2,123,000	$2,550,000	$5,160,000	$16,152,000	$32,807,000
Infrastructure Cost[2]		$2,529,000[3]	$2,620,000[3]	$2,620,000[3]	$2,032,000	$2,499,000	$3,941,000	$2,964,000	$2,401,000	$1,466,000	$2,964,000	$3,510,000	$2,401,000	$917,000	$1,374,000	$2,250,000	$7,664,000	$15,683,000
Direct Cost Subtotal[4]		**$3,761,000**	**$4,868,000**	**$5,875,000**	**$3,904,000**	**$4,296,000**	**$8,933,000**	**$6,571,000**	**$7,701,000**	**$3,037,000**	**$6,939,000**	**$9,011,000**	**$8,242,000**	**$3,039,000**	**$3,924,000**	**$7,410,000**	**$23,820,000**	**$48,490,000**
Construction and Estimating Contingency	40%	$1,504,400	$1,947,200	$2,350,000	$1,561,600	$1,718,400	$3,573,200	$2,628,400	$3,080,400	$1,214,800	$2,775,600	$3,604,400	$3,296,800	$1,215,600	$1,569,600	$2,964,000	$9,528,000	$19,396,000
TOTAL CONSTRUCTION COST		**$5,270,000**	**$6,820,000**	**$8,230,000**	**$5,470,000**	**$6,010,000**	**$12,510,000**	**$9,200,000**	**$10,780,000**	**$4,250,000**	**$9,710,000**	**$12,620,000**	**$11,540,000**	**$4,250,000**	**$5,490,000**	**$10,370,000**	**$33,350,000**	**$67,890,000**
Engineering, Legal, Administrative & Project	25%	$1,317,500	$1,705,000	$2,057,500	$1,367,500	$1,502,500	$3,127,500	$2,300,000	$2,695,000	$1,062,500	$2,427,500	$3,155,000	$2,885,000	$1,062,500	$1,372,500	$3,111,000[5]	$10,005,000[5]	$20,367,000[5]
TOTAL PROJECT COST		**$6,590,000**	**$8,530,000**	**$10,290,000**	**$6,840,000**	**$7,510,000**	**$15,640,000**	**$11,500,000**	**$13,480,000**	**$5,310,000**	**$12,140,000**	**$15,780,000**	**$14,430,000**	**$5,310,000**	**$6,860,000**	**$13,480,000**	**$43,360,000**	**$88,260,000**
Volume of Water Delivered	mgd	0.14	0.14	0.14	0.04	0.03	0.09	0.07	0.10	0.03	0.07	0.09	0.10	0.04	0.04	0.59	2.02	5.04
Volume of Water Delivered	AFY	152	152	152	44	39	106	81	113	35	81	106	113	42	49	665	2,258	5,646
Annualized Project Cost ($/year)		$260,000	$330,000	$400,000	$270,000	$290,000	$610,000	$450,000	$520,000	$210,000	$470,000	$610,000	$560,000	$210,000	$270,000	$520,000	$1,680,000	$3,420,000
ANNUAL O&M ($/year)		$121,000	$117,000	$129,000	$122,000	$125,000	$149,000	$137,000	$136,000	$119,000	$120,000	$140,000	$131,000	$87,000	$97,000	$290,000	$1,194,000	$2,934,000
Total Annualized Cost ($/year)		**$381,000**	**$447,000**	**$529,000**	**$392,000**	**$415,000**	**$759,000**	**$587,000**	**$656,000**	**$329,000**	**$590,000**	**$750,000**	**$691,000**	**$297,000**	**$367,000**	**$810,000**	**$2,874,000**	**$6,354,000**
Unit Cost ($ / AF of Net Potable Offset)		**$2,500**	**$2,930**	**$3,470**	**$8,880**	**$10,680**	**$7,180**	**$7,280**	**$5,800**	**$9,430**	**$7,320**	**$7,100**	**$6,110**	**$7,130**	**$7,570**	**$1,220**	**$1,270**	**$1,100**
Treatment		Dynasand/Cl[6][7]	MF/ Cl[6][7]	MF/RO/UV[6]	MF/RO/UV[6]	MF/RO/UV[6]	MF/RO/UV[6]	MF/RO/UV[6]	MF/RO/UV[6]	MF/RO/UV[6]	Prescreen/MBR/UV[8]	Prescreen/MBR/UV[8]	Prescreen/MBR/UV[8]	Prescreen/MBR/UV[8]	Prescreen/MBR/UV[8]	Ozone/BAF/MF/RO/UV/H2O2/Cl/storage[6]	Ozone/BAF/MF/RO/UV/H2O2/Cl/storage[6]	Ozone/BAF/MF/RO/UV/H2O2/Cl/storage[6]

Annualized Cost
Interest 1.0%
Payment Period 30

Notes:
(1) Treatment costs include costs for the treatment processes listed at the bottom of each column.
(2) Infrastructure costs includes pipeline, pumping, storage, traffic control, and a connection fee of $20K for commercial users and $5K for irrigation users.
(3) Infrastructure costs for this project also includes $1,190,000 (before contingencies) for dual plumbing at San Quentin Prison. This includes a retrofit for the North, South, East, and West Blocks as well as turnouts for connecting to the boiler/irrigation users and a potential carwash facility. Copper piping was assumed for in-building piping.
(4) Land acquisition costs are not included in these estimates.
(5) Increased contingency to 30% to account for additional permitting and outreach needed with a DPR project.
(6) This treatment is in addition to CMSA's existing secondary treatment system.
(7) These alternatives assume additional treatment is provided at San Quentin Prison depending on water quality needs.
(8) This is the complete treatment needed for recycled water uses.

APPENDIX J – DETAILED FINANCIAL CALCULATIONS

Central Marin Sanitation Agency / Marin Municipal Water District
Recycled Water Feasibility Study
Assumptions

User Input

	Recommended Alternative
Period of Analysis	50 years
Recycled Water Market Price (per AF)	
Potable Water Replacement Factor (for RW)	1.0
Project Design Year (Start)	2017
Construction Year (Start)	2019
First Year of Operation	2020
Project Useful Life (End Year)	2069
Debt Payment Start Year	2021
Demand Summary	
Annual Average Demand (afy)	152.5
Maximum Day Demand (mgd)	0.20
Maximum Day Supply (mgd)	
Estimated Costs	
Capital Cost	$ 6,820,000
Subtotal Construction Cost	**6,820,000**
Additional Costs	1,710,000
Total Project Costs	**8,530,000**
O&M Cost per AF	N/A
Annual O&M & R&R	$ 117,000
Blend Water ($/AF)	N/A
Blend Water	$ -
Total Annual O&M	**$ 117,000**
Unit Cost ($/AF)	**$ 2,930**
Cumulative Cost ($/AF)	
Financial and Rate Assumptions	
Capital Cost Escalation	0.0%
O&M Cost Escalation (Annual Inflation Rate)	3.0%
Annual Interest Rate - Earning Rates	1.5%
Include Annual Rate Increase?	☑ Yes
Annual Service Charge Rate Increase	3.0%
Discount Rate	3.0%
Beginning Fund Balance	$ -
Loan/Debt Assumptions	
Issue Debt? (PAYGO if no Check)	☑ Yes
SRF Loan (Check Box if Yes)	☑ Yes
Debt Term	**30 Years**
Interest Rate	1.0%
Annual Debt Service	$330,000
Payments Over Duration of Debt	$9,900,000

		2016	2017	2018	2019	2020	2021	2022	2023
Maximum Net Revenue	$ 25,000								
RW Unit Cost $/HCF (Existing MMWD rate $7.48 (Tier 2))	$ 6.73	$ 6.93	$ 7.14	$ 7.36	$ 7.58	$ 7.58	$ 7.58	$ 7.58	$ 7.58

Central Marin Sanitation Agency / Marin Municipal Water District
Recycled Water Feasibility Study
Cash Flow Forecast

	FY 2016	**FY 2017**	**FY 2018**	**FY 2019**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**
BEGINNING FUND BALANCE	$0	$0	$0	$0	$0	$374,430	$418,022	$458,168	$494,694
Recycled Water Usage (AF)									
New User Usage					153	153	153	153	153
Recycled Water Usage (AF)	-	-	-	-	153	153	153	153	153
Recycled Water Rate ($/AF)	$2,932 AF	$3,020 AF	$3,111 AF	$3,204 AF	$3,301 AF	$3,301 AF	$3,301 AF	$3,301 AF	$3,301 AF
Recycled Water Revenue	$ -	$ -	$ -	$ -	$ 503,328	$ 503,328	$ 503,328	$ 503,328	$ 503,328
Interest Income	-	-	-	-	2,787	5,899	6,523	7,093	7,609
TOTAL SOURCES	$0	$0	$0	$0	$506,115	$509,227	$509,850	$510,421	$510,936
USES OF FUNDS									
O&M									
Recommended Alternative	-	-	-	-	131,685	135,635	139,704	143,895	148,212
Debt Service									
Recommended Alternative	-	-	-	-	-	330,000	330,000	330,000	330,000
PAYGO Capital									
Other	-	-	-	-	-	-	-	-	-
TOTAL USES	$0	$0	$0	$0	$131,685	$465,635	$469,704	$473,895	$478,212
Net Revenue	$0	$0	$0	$0	$374,430	$43,592	$40,146	$36,526	$32,724
ENDING FUND BALANCE	$0	$0	$0	$0	$374,430	$418,022	$458,168	$494,694	$527,418
Capital Funding Analysis									
Bond/Loan Proceeds - SOURCES									
Recommended Alternative	-	-	-	8,530,000	-	-	-	-	-
Total Sources	$0	$0	$0	$8,530,000	$0	$0	$0	$0	$0
CIP Program - USES									
Recommended Alternative	-	-	-	8,530,000	-	-	-	-	-
Additional "Buy-In" Capital	-	-	-	-	-	-	-	-	-
Total Uses	-	-	-	8,530,000	-	-	-	-	-

Central Marin Sanitation Agency / Marin Municipal Water District
Recycled Water Feasibility Study
Recycled Water Price

	Recommended Alternative
Total Capital Cost	$9,900,000
Annual Recycled Water Consumption	152.5 AFY
Price per Acre-Foot	$64,920
Annualized (30/yr)	$2,164
Total Annual O&M	$117,000
Annual Recycled Water Consumption	152.5 AFY
Price per Acre-Foot	$767
Price per HCF	$1.76
Total Cost Per Acre-Foot	$2,931

Sensitivity Analysis

Recycled Water Consumption	152.5 AFY
5% Less	145 AFY
10% Less	137 AFY
25% Less	114 AFY

Capital Costs	
Price per Acre-Foot	$2,164
Price per Acre-Foot (-5%)	$2,278
Price per Acre-Foot (-10%)	$2,404
Price per Acre-Foot (-25%)	$2,885
O&M and R&R Costs	
Price per Acre-Foot	$767
Price per Acre-Foot (-5%)	$808
Price per Acre-Foot (-10%)	$852
Price per Acre-Foot (-25%)	$1,023

Central Marin Sanitation Agency / Marin Municipal Water District
Recycled Water Feasibility Study
Recycled Water Price

Year	Reclaimed Water Sales, AF	Design & Construction Cost $ /a/	O&M Costs, $		Salvage Value, $ /c/	Discount Factor	Present Value of Costs, $				
			Fixed /b/	Variable /b/		3.0%	Design & Construction Cost	O & M Costs Fixed	O & M Costs Variable	Salvage Value	Total
2016	-	-	-			1.00000	-	-	-		-
2017	-	-	-			0.94340	-	-	-		-
2018	-	-	-			0.89000	-	-	-		-
2019	-	8,530,000	-			0.83962	7,161,952	-	-		7,161,952
2020	152.5	-	117,000			0.79209	-	92,675	-		92,675
2021	152.5	-	117,000			0.74726	-	87,429	-		87,429
2022	152.5	-	117,000			0.70496	-	82,480	-		82,480
2023	152.5	-	117,000			0.66506	-	77,812	-		77,812
2024	152.5	-	117,000			0.62741	-	73,407	-		73,407
2025	152.5	-	117,000			0.59190	-	69,252	-		69,252
2026	152.5	-	117,000			0.55839	-	65,332	-		65,332
2027	152.5	-	117,000			0.52679	-	61,634	-		61,634
2028	152.5	-	117,000			0.49697	-	58,145	-		58,145
2029	152.5	-	117,000			0.46884	-	54,854	-		54,854
2030	152.5	-	117,000			0.44230	-	51,749	-		51,749
2031	152.5	-	117,000			0.41727	-	48,820	-		48,820
2032	152.5	-	117,000			0.39365	-	46,057	-		46,057
2033	152.5	-	117,000			0.37136	-	43,450	-		43,450
2034	152.5	-	117,000			0.35034	-	40,990	-		40,990
2035	152.5	-	117,000			0.33051	-	38,670	-		38,670
2036	152.5	-	117,000			0.31180	-	36,481	-		36,481
2037	152.5	-	117,000			0.29416	-	34,416	-		34,416
2038	152.5	-	117,000		109,000	0.27751	-	32,468	-	30,248	2,220
Total	2,898	8,530,000					7,161,952	1,096,123	-	30,248	8,227,827

Unit Cost ($/AF) = (Total present value of costs)/(Total present value of sales) = $2,840 per acre-foot

/a/ All costs adjusted to current dollars

/b/ Assumed that fixed costs equals all costs except for the cost of water purchase.

/c/ Useful lives: Average useful life of 50 years assumed for the infrastructure. No salvage value for engineering, legal & administration costs.