City of Malibu Engineer's Report for the Production, Distribution and Use of Recycled Water – Phase 1

September 2014

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List of Abbreviations

BOD	Biological Oxygen Demand
CCR	California Code of Regulations
CCWTF	Civic Center Wastewater Treatment Facility
CDPH	California Department of Public Health
GE	General Electric
gpd	Gallons per day
gpm	Gallons per minute
LARWQCB	Los Angeles Regional Water Quality Control Board
LBS	Pounds
MBR	Membrane Bioreactor
mg/L	Milligrams per liter
MGD	Million gallons per day
MOU	Memorandum of Understanding
MPN	Most probable number
NGO	Non-governmental Organization
NTU	Nephelometric Turbidity Units
O&M	Operations and Maintenance
OWDS	Onsite Wastewater Discharge Systems
TKN	Total Kjeldahl Nitrogen
TSS	Total Suspended Solids
USEPA	United States Environmental Protection Agency
UV	Ultraviolet

1 Introduction and Purpose of this Report

The City of Malibu (City) is located in northwestern Los Angeles County and is home to approximately 13,000 residents. The City's Civic Center Area currently uses on-site wastewater disposal systems (OWDS) to treat and dispose of municipal wastewater. These OWDS have allegedly contributed to the non-point source pollution of Malibu Creek and Lagoon, resulting in the Los Angeles Regional Water Quality Control Board (LARWQCB) adopting Resolution R4-2009-007 in November 2009. This resolution approved an amendment to Chapter IV of the *Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (also known as the Basin Plan) prohibiting OWDS and OWDS discharges in the Malibu Civic Center Area. In 2010, the State Water Resources Control Board (SWRCB) adopted Resolution 2010-0045 approving the amendment and established a phased schedule for compliance.

The resolutions prohibit all new OWDS and discharges from existing systems based on a phased schedule to cease discharges from Phase 1 systems by November 5, 2015 and Phase 2 systems by November 5, 2019. A third phase may be implemented, if necessary, following operation of Phase 1 and 2, and upon completion of a water quality sampling program to determine if implementation of Phases 1 and 2 have resulted in a meaningful decrease in bacteria and nitrogen in Malibu Lagoon. If implemented, Phase 3 would be completed after 2019 and would result in the cessation of all OWDS use in the Civic Center Area.

The area in which OWDS use must cease was defined in the afore-mentioned resolutions and is referred to as the "Prohibition Zone." An August 2011 Memorandum of Understanding (MOU), signed by both the City and the LARWQCB, memorializes the requirements of the resolutions and defines the Prohibition Zone areas. Following execution of the MOU, the City embarked on a program to design and construct a centralized wastewater collection, treatment and disposal system for the Prohibition Zone. This program includes the construction of the Civic Center Wastewater Treatment Facility (CCWTF), where wastewater from the Prohibition Zone will be collected and treated to a standard set forth in Title 22 of the California Code of Regulations (CCR) for unrestricted reuse of disinfected tertiary recycled water.

The resultant recycled water will be used for landscape irrigation and other non-potable uses within the Civic Center and surrounding areas to the maximum extent possible; however, anticipated irrigation demands are not expected to utilize all recycled water generated by the CCWTF. Recycled water not used for landscape irrigation will be injected into the underlying Malibu Valley Groundwater Basin for dispersal or percolated into the separate Winter Canyon aquifer.

The intent of this report is to meet the requirements of the CCR Title 22, Division 4, Chapter 3, Article 7 (Title 22), also referred to as the "Engineer's Report". As defined herein, the City of Malibu will be responsible for the production of recycled water, distribution of recycled water to customers and recycled water use area oversight. This Engineer's Report covers the production, distribution and use of recycled water within the City for the Phase 1 system (Supplemental Engineer's Report(s) will be prepared when subsequent project phases are undertaken). The CCWTF will produce disinfected tertiary recycled water for unrestricted use, meeting the highest level of treatment under Title 22.

2 Project Description/Background

2.1.1 Overview of Malibu Civic Center Area

The Malibu Civic Center Area has been the subject of numerous recent analyses pertaining to water quality impairments. Permitting decisions and water quality studies done in the area have focused on nutrient loading to the Malibu Creek Watershed, and more specifically, Malibu Lagoon (Lagoon), which is located near the southeastern corner of the Malibu Valley Groundwater Basin (Basin). The U.S. Environmental Protection Agency (USEPA) and LARWQCB have made significant efforts to protect the basin from non-point source pollution; the previously-mentioned orders are intended to further that effort.

OWDSs represent a major category of non-point sources for nutrient and coliform pollution to Malibu Creek and Lagoon, and have received significant attention and criticism from permitting agencies, non-governmental organizations (NGOs), and the general public. OWDS exist as individual or collective septic systems that treat wastewater from residential and commercial buildings and discharge the resultant effluent to the groundwater basin through leachfields. Primary concerns regarding water quality impairments within the area of the Creek and Lagoon include coliform bacteria, nitrogen, and phosphorus. The CCWTF Project is comprised of a centralized wastewater collection and treatment system that will capture and treat wastewater flows in hopes of reversing the effects of OWDS use on Creek and Lagoon water quality over past years.

2.1.2 Need for Centralized WWTP

The August 2011 Memorandum of Understanding (MOU) between the City and LARWQCB formalizes the agreement for the phased cessation of use of OWDS in the Malibu Civic Center Area. The MOU memorializes the parties' agreement to coordinate and implement a centralized wastewater collection and treatment project in the Malibu Civic Center Area. It calls for every site that uses OWDSs to be eventually connected to the Civic Center Wastewater Treatment Facility and prohibits the use of OWDSs in the Prohibition Zone by 2025.

The proposed CCWTF will produce treated effluent that meets wastewater discharge quality standards as outlined in the CCR Title 22 for disinfected tertiary water. The phased approach to connecting every facility to the CCWTF will eliminate or greatly reduce the amount of non-point source pollution discharged from OWDSs and will result in disinfected recycled water suitable for unrestricted non-potable reuse beginning with Phase 1 of the project. The primary objective of the project is to reuse this recycled water for landscape irrigation and other non-potable uses in the Civic Center area; any unused recycled water will be injected or percolated into the underlying Malibu Valley Groundwater Basin.

2.1.3 Sanitary Sewer Collection System and Treatment

Figure 2-1 shows the proposed wastewater collection system for Phase 1 of the CCWTF Project. All pipelines will be underground, in public right-of-ways (streets) and in easements. All pump stations will be located below ground, on public right-of-ways and/or easements. Backup generators and electrical panels will be located partially below ground and will be fenced and screens for security and to minimize visual impacts.

The wastewater that is collected in the Civic Center area of the system will be centralized at a lift station located at the corner of Webb Way and Civic Center Way. The lift station will transfer the raw sewage through a force main to the treatment plant located at the Winter Canyon Site. A second lift station will transfer wastewater flows from Bluffs Park and from proposed nearby residential development to the treatment plant.

2.1.4 Recycled Water Distribution and Application

The recycled water distribution system is described in Chapter 4 Recycled Water Transmission and Distribution Systems. Recycled water will be used for landscape irrigation and other non-potable water uses such as toilet flushing and dust control. Any unused recycled water will be injected into the underlying Malibu Valley Groundwater Basin via one of three injection wells located along Malibu Road and/or percolated into the Winter Canyon alluvium via percolation ponds located on the plant site. A well construction and operation ordinance will be developed and enacted by the City of manage the installation and use of future wells in the groundwater basin, both to protect the operations of the injection wells and to protect against the inadvertent extraction and unprotected use of injected recycled water blended with groundwater.

Figure 2-1: CCTWF Phase 1 Project Facilities

3 Recycled Water Production Facilities

This section describes the recycled water production facilities, including source water quality, treatment processes, monitoring programs and contingency plans.

3.1 Source Water Quality

3.1.1 Source and Quality of Water for Tertiary Treatment

At present, all effluent wastes in the City of Malibu are disposed of either through septic systems (OWDS) or small, area-specific treatment systems. Because of the lack of a centralized sewer collection system or wastewater treatment facility in Malibu, there are limited data available regarding wastewater quality. Between February 23rd and March 26th of 2013, wastewater samples were collected every 15 minutes from the influent tee of a 48,000 gallon septic tank at the existing Winter Canyon wastewater treatment facility (the proposed location of the new CCWTF facility). Influent at this existing plant is from a shopping center located south of Malibu Road, a nearby gas station and a commercial building, and represents 'average' commercial wastewater influent. These data, along with standard values from academic research, are providing the basis for the design of the new CCWTF Project. Table 3-1 summarizes the median and 95Th percentile values for a variety of raw wastewater constituents.

3.1.2 Wastewater Sources and Pollution Prevention

The source of wastewater for the proposed CCWTF Project is municipal and commercial influent from the Civic Center Area within the city limits of Malibu. The City is comprised primarily of residential dwellings with some commercial and one industrial facility. The first two phases of implementation of the CCWTF consist only of residential and commercial flows. At present, the City does not implement any source control programs. As the City moves towards full Project implementation (through Phase 3), an industrial customer will be brought into the collection system and source control measures will be developed and implemented by the City.

Table 3-1: Expected Quality of Raw Wastewater at CCWTF

Constituent	Units	Median	95th Percentile
Total Alkalinity	mg/L	434	460
Carbonate Alkalinity	mg/L	Non Detect	---
Bicarbonate Alkalinity	mg/L	434	460
Hydroxide Alkalinity	mg/L	Non Detect	----
Ammonia as N	mg/L	45	50
Biochemical Oxygen Demand	mg/L	290	332
Chloride	mg/L	317	345
Chemical Oxygen Demand	mg/L	976	1153
Filtered Chemical Oxygen Demand	mg/L	624	708
Electrical Conductivity	mmhos/cm	2329	2601
Total Hardness	mg/L	359	387
Nitrite as N	mg/L	0	0
Nitrate as N	mg/L	18	22
Oil and Grease	mg/L	10	13
pH	pH units	7	7
Orthophosphate as P	mg/L	9	11
Phosphorus	mg/L	9	11
Soluble BOD	mg/L	173	205
Total Dissolved Solids	mg/L	1540	1712
Total Kjeldahl Nitrogen	mg/L	46	51
Total Suspended Solids	mg/L	156	187
Volatile Suspended Solids	mg/L	138	167
Adjusted Sodium Adsorption Ratio		6	7
Calcium	mg/L	71	77
Magnesium	mg/L	43	46
Sodium	mg/L	273	304

3.2 Proposed Recycled Water Treatment Processes

3.2.1 Treatment Process Description

The layout of the CCWTF is shown in Figure 3-1. The treatment process for Title 22 tertiary quality water will be as follows (and as shown in Figure 3-2):

- Headworks (mechanical screening and grit removal)
- Membrane Bioreactor (MBR)
    - Biological Reactor
    - Membrane
- UV Disinfection
- Residual Chlorine Dosing

- Recycled Water Distribution Pump Station
- Recycled Water Storage Tank

While UV disinfection will provide the primary disinfection necessary to meet Title 22 requirements, additional chlorine will be added to the recycled water stream at the treatment plant site, downstream of the UV disinfection system. A residual chlorine concentration of 2 mg/L will be maintained. Average flows and loading rates to the treatment facility will be as follows:

Table 3-2: CCWTF Loading Rates

Loads and Flows	Units	Value
Average Annual Flow	GPD	190,900
Max Day Flow	GPD	276,000
Peak Hour	GPD	644,000
Average BOD Loading	LBS/DAY	595
Max Day BOD Loading	LBS/DAY	668
Average TSS Loading	LBS/DAY	405
Max Day TSS Loading	LBS/DAY	523
Average TKN Loading	LBS/DAY	98
Max Day TKN Loading	LBS/DAY	111
Average Ammonia Loading	LBS/DAY	82
Max Day Ammonia Loading	LBS/DAY	93
Average Phosphorous Loading	LBS/DAY	20
Max Day Phosphorous Loading	LBS/DAY	23

Figure 3-1: CCWTF Site Plan

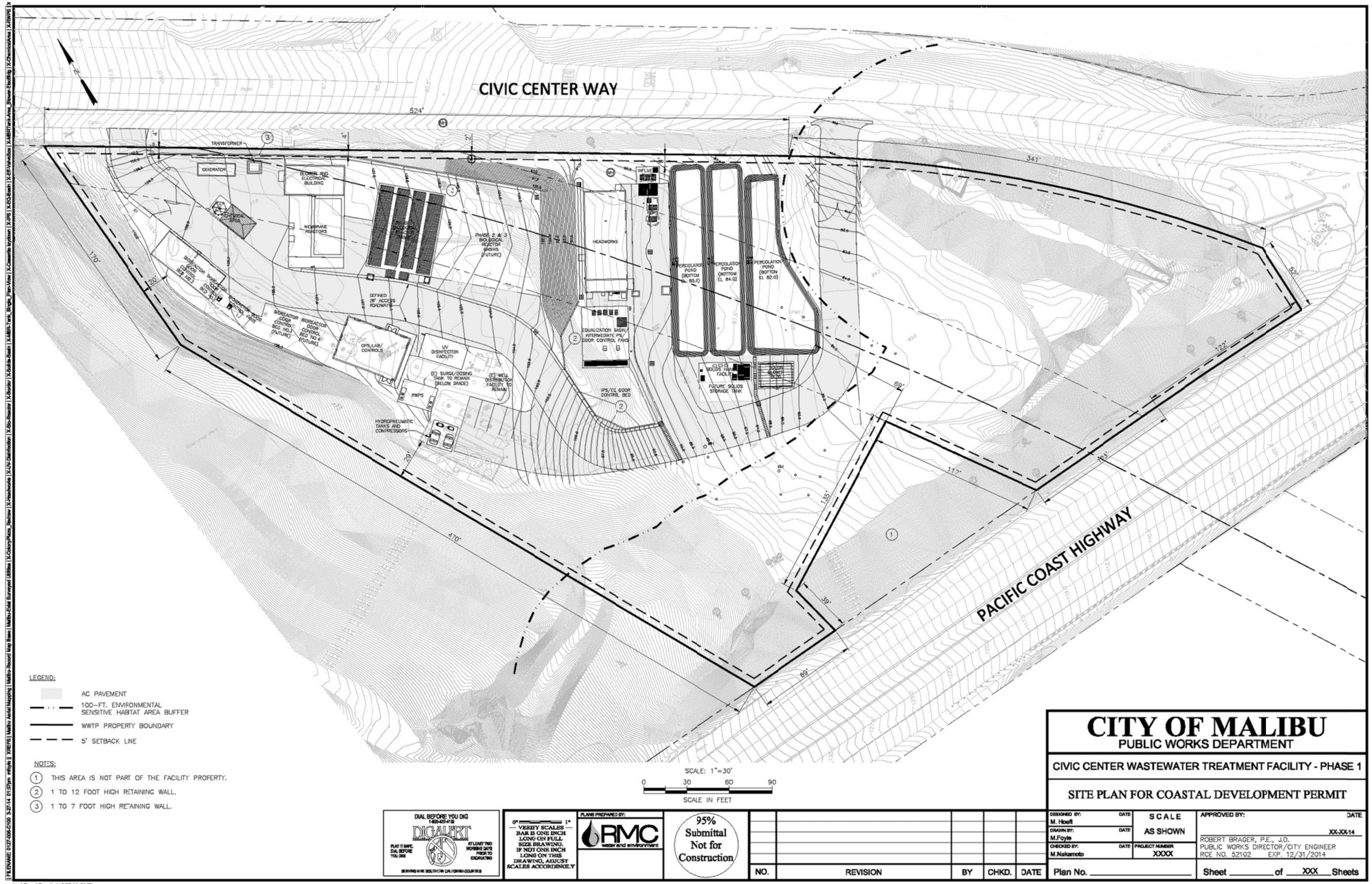
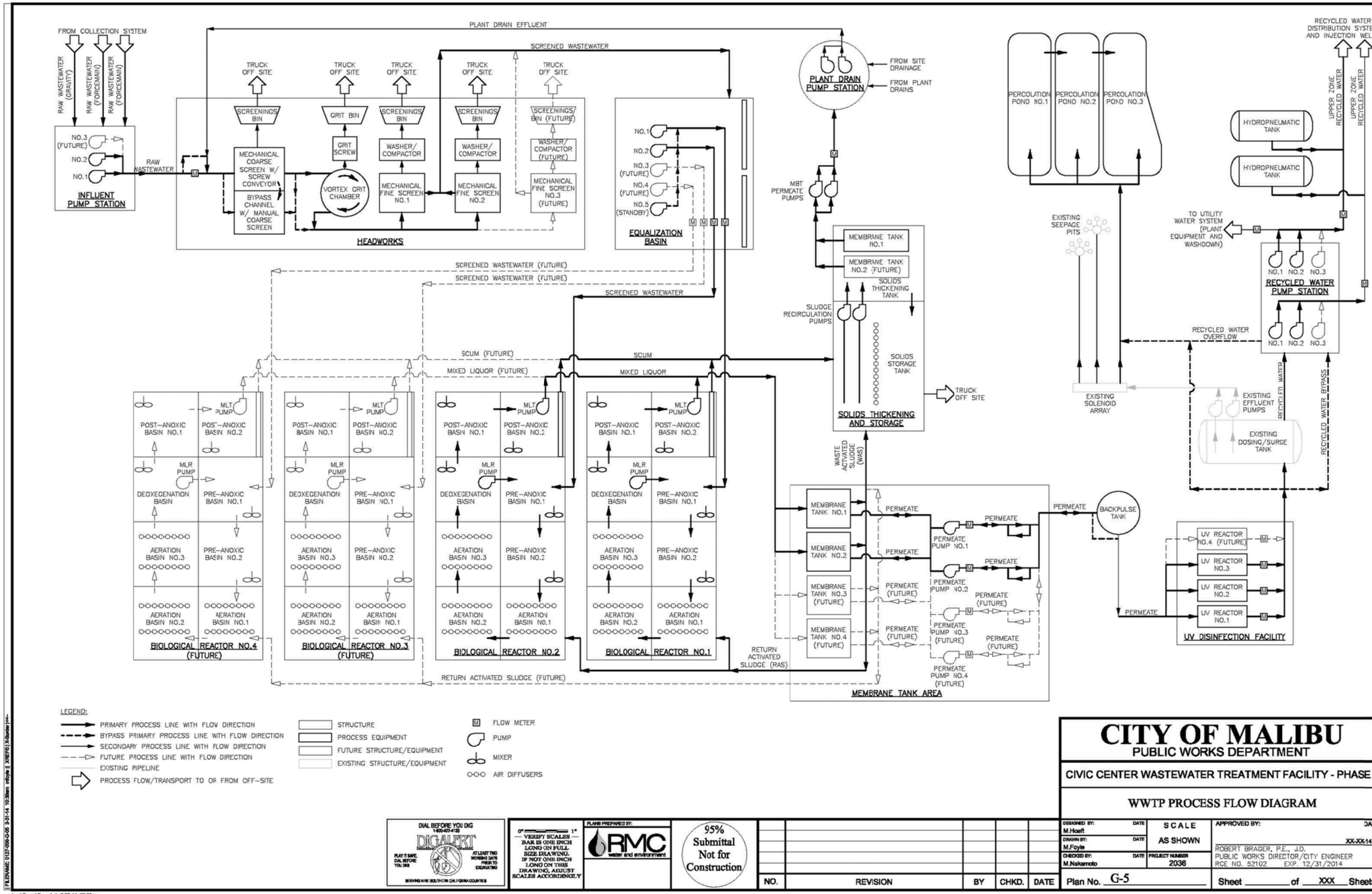


Figure 3-2: CCWTF Process Flow



3.2.2 Title 22 Design Criteria

Table 3-3 summarizes the requirements set forth in Title 22 for disinfected tertiary recycled water.

Table 3-3: Title 22 Facility Requirements

Parameter	Maximum Title 22 Requirements for Disinfected Tertiary RW (Not to Exceed)
Tertiary Treated Effluent Turbidity	0.2 NTU more than 5 percent of the time within a 24-hour period (not to exceed)
	0.5 NTU at any time (not to exceed)
Tertiary Treated Effluent Total Coliform Bacteria	2.2 MPN / 100 mL per 7 day period (not to exceed)
	23 MPN / 100 mL per 30 day period (not to exceed)
	240 MPN / 100 mL during all periods (not to exceed)

3.2.3 Treatment Process Components

Membrane Bioreactor

The membrane bioreactor receives treated primary effluent after the headworks (mechanical screening and grit screening) process area. The membranes will be a hollow fiber membrane manufactured by General Electric (GE) Model 500D or approved equal; these membranes have a height of approximately 72 to 85 inches. This type of membrane equates to an ultrafiltration membrane pore size. Table 3-4 and Table 3-5 summarize design criteria for the bioreactor and membrane reactor processes. Influent turbidity is anticipated to have a MLSS of 8,000 mg/L suspended solids; treated effluent is expected to have a turbidity level of less than 0.2 NTUs.

Table 3-4: Bioreactor Design Criteria

Description	Criteria
Bioreactor	
Mixed Liquor Suspended Solids	8000 mg/L
Mean Cell Residence Time at Average Flow	22.3 days
Hydraulic Retention Time at Average Flow	35.8 hrs
Aeration Type	Fine Bubble
Mixing Type	Submersible
Number of Trains	2
Number of Pre-Anoxic Basins Per Train	2
Volume, Total	24,500 gals
Number of Aeration Basins Per Train	3
Volume, Total	65,000 gals
Number of De-Oxygenation Basins Per Train	1
Volume, Total	11,000 gals
Number of Post-Anoxic Basins Per Train	2
Volume, Total	21,100 gals

Table 3-5: Membrane Design Criteria

Membrane Reactor	
Mixed Liquor Suspended Solids	8000 mg/L
Aeration Type	Coarse Bubble
Membrane Type	Hollow Fiber
Manufacturers	GE, Koch, or Approved Equal
Model	500 D
Modules Per Cassette	48
Cassettes Per Train	1
Numbers of Trains	2
Design Flux at Average Day Flow (Phase 1A)	7.2
Design Flux at Max Day Flow (Phase 1A)	14.1
Design Flux at Average Day Flow (Phase 1)	8.3
Design Flux at Max Day Flow (Phase 1)	9.7
Design Flux at Average Day Flow (Buildout)	9.4
Design Flux at Max Day Flow (Buildout)	11.7
Backpulse Rate (gpd/sf)	12

UV Disinfection

From the membrane bioreactors, filtered effluent flows to the ultraviolet (UV) system for disinfection. The UV disinfection system will be a closed conduit type consisting of two duty trains and one standby train. Lamps will be a low pressure high output type with a minimum of 8 lamps per reactor and one reactor per train. Each reactor will have a capacity of 0.1 MGD. Table 3-6 shows design criteria for the UV disinfection system; only CDPH-approved systems will be used.

Table 3-6: UV Disinfection System Design Criteria

Description	Criteria
UV Disinfection	
Type	Closed Conduit
Lamp Type	Low Pressure High Output
Number of Trains (Duty/Standby)	2/1
Number of Reactors Per Train	1
Lamps Per Reactor	8 min
Capacity (Each Reactor)	0.1 MGD

Cleaning of the UV disinfection system will be automatically controlled by the process control system to maintain the required minimum UV dose. The CCWTF SCADA system will vary the number of lamp banks that are operating, as well as the lamp intensity at which the banks are operating based on the influent flow and the UV transmittance in the UV influent chamber.

Following construction and prior to activation of the CCWTF for recycled water distribution, the UV system will be tested to ensure that pathogen inactivation is achieved to the levels required by Title 22. The testing will be performed in accordance with NWRI2003 UV Guidelines. Following completion of the testing, a report summarizing the procedure and results from the testing will be submitted to the City and the California Department of Public Health (CDPH) for review and approval.

Chemical Feed Systems

All chemicals used at the CCWTF site are stored in the enclosed chemical storage area. Chemicals to be stored onsite include Micro C, sodium hydroxide, magnesium hydroxide, sodium hypochlorite, citric acid and polyaluminum chloride. The chemical feed system will consist of chemical storage containers (250 to 4,000 gallon storage tanks and totes), metering pumps, piping, and injection points. The primary chemicals that will be used in the treatment process are citric acid and polyaluminum chloride (coagulant). Dosing rates are show in Table 3-7; only CDPH-approved systems will be used.

Table 3-7: Dosing Rates and Use Location at CCWTF

Chemical	Use Location	Dose
MicroC	Post Anoxic Zone No. 1 (Bioreactors)	~10 gallons/day for 125,000 gpd flow rate
Citric Acid	Membrane Tanks	200 mg/L for 2 cleanings per year
Magnesium Hydroxide	Screened effluent pipe before Equalization Tank	~71 mg/L
Sodium Hypochlorite	Membrane Tanks UV effluent pipe prior to Recycled Water Clearwell	200 mg/L 5 mg/L
PolyAluminum Chloride	Membrane Influent Pipe from Bioreactor	28.7 mg/L Aluminum

A sodium hypochlorite storage and feed system will also be installed for periodic maintenance and cleaning use. The chemical systems will be designed to maximize flexibility to facilitate changes between multiple liquid chemical types to optimize treatment at the plant.

3.2.4 Recycled Water Storage and Pumping

From the UV disinfection system and under normal operations, the tertiary treated recycled water either flows to a 50,000 gallon fiber reinforced plastic storage tank or directly to the recycled water pump station for distribution. From the storage tank, recycled water is pumped for distribution to either the upper or lower zones. Table 3-8 shows design criteria for the recycled water storage and pump stations. Procedures for diverting water that does not meet Title 22 specifications are described in Section 3.6.

Table 3-8: Recycled Water Storage and Pump Station Design Criteria

Description	Criteria
Recycled Water Storage	
Type	Buried Fiber Reinforced Plastic Tank
Number	1
Volume	50,000 gallons
Recycled Water Distribution Pump Station – Upper Zone	
Type	Vertical Turbine Pump
Number (Duty/Standby)	1/1
Capacity (each)	120 gpm
Total Dynamic Head	325 ft
Motor Size	15 HP
Recycled Water Distribution Pump Station – Lower Zone	
Type	Vertical Turbine Pump
Number (Duty/Standby)	1/1
Capacity (each)	300 gpm
Total Dynamic Head	200 ft
Motor Size	25 HP

3.2.5 Operation and Maintenance Manuals

Operation and Maintenance (O&M) manuals for all treatment equipment are available in an electronic web-based format, accessible to all treatment plant staff via any on-site computer.

3.3 Plant Reliability Features

Reliability features at the CCWTF were selected to produce consistent recycled water effluent quality meeting the requirements of Title 22 and to provide the ability to shut down recycled water delivery if the water does not meet the Title 22 requirements. In general, reliability is established by redundancy in treatment equipment, providing necessary back-up systems if a critical process component fails. The recycled water customers will not be dependent on a continuous supply of recycled water and will be able to access potable water on site for backup should recycled water deliveries not be available. This supply redundancy will occur through the use of an air gap at the wet well of the recycled water distribution pump station and will be managed at the plant site. Allowing for potable water to be placed in the recycled water pump station wet well (and from there, into the recycled water distribution system) will provide the necessary supply redundancy.

Reliability features at the CCWTF will include:

- Redundant treatment equipment to allow maintenance and repairs to be made without taking the entire facility offline; and
- Alarms to indicate problems with the treatment facility process units.

3.3.1 Redundant Treatment Equipment

The CCWTF is designed with multiple treatment trains and redundant features to increase the reliability of the system. Table 3-9 summarizes the number of duty and standby units in treatment process. In addition to redundant equipment, the membranes are designed to typically operate at a lower flux rate than the maximum design flux rate. This allows more flow to be pushed through one of the membrane trains if the second train needs to be taken offline.

Table 3-9: Treatment Process Train Reliability

Process	Number of Duty Units	Number of Standby Units
Bioreactor Train	1 complete train	1 complete train
UV Disinfection Train	2 complete trains	1 complete train
Recycled Water Distribution Pump Station – Upper Zone	1 pump	1 pump
Recycled Water Distribution Pump Station – Lower Zone	1 pump	1 pump

3.3.2 Alarms

Key process alarms are summarized below. Some alarms will indicate a problem condition only, while critical alarms are accompanied by automated system responses. All alarms will be integrated into the SCADA system at the on-site operations building and remote access portable computers. The CCWTF will be staffed on-site during business hours (eight hours per day, Monday through Friday); after hours, alarms will trigger a phone dial out system or other remote notification system that will notify the on-call operator or manager. The on-call operator will be notified of an alarm condition and will respond accordingly.

Alarms will be used to annunciate conditions such as:

- Loss of power;
- Failure of treatment processes/equipment (e.g. pump failure, mixer failure);
- Low and high water levels in the pump station wet wells;
- High pressure in pump discharges; and
- Turbidity and/or UV disinfection not meeting Title 22 requirements.

Critical alarms capabilities and the on-call operator notification system are tested on a weekly basis.

3.3.3 Power Supply

The backup power supply for the CCWTF is an on-site standby diesel generator.

3.4 Supplemental Water Supply

Supplemental water supplies will be the responsibility of the individual use sites. In the event of an outage at the CCWTF, recycled water use site supervisors will be notified by phone that recycled water deliveries will be on hold and that they should initiate use of their backup supplies. For information on cross-connection control prevention at use sites, see Section 5.3.4.

3.5 Monitoring and Reporting

Monitoring and reporting will be performed by City of Malibu staff in compliance with the requirements of the City's Master Reclamation Permit. Recycled water effluent quality monitoring will occur between UV disinfection and recycled water storage/distribution by a recycled water composite sampler. Turbidity will be sampled continuously while disinfected recycled water will be sampled at least once a day for total coliform bacteria. The composite sampler will be calibrated periodically when the recycled water distribution system demands are low. Water quality samples will be analyzed either onsite by the City of Malibu (provided the new analytical laboratory at the CCWTF site qualifies as a state-certified analytical laboratory) or by an off-site state-certified analytical laboratory.

3.6 Contingency Plan

Per Section 60323(c) of the Water Recycling Criteria, the following outlines contingency planning for the CCWTF for the management of inadequately treated wastewater, if it were produced, to prevent it from being delivered to recycled water users.

1. *List of conditions which would trigger an immediate diversion to take place:*
   - High Filter Effluent Turbidity, defined as any of the following conditions:
     i. 24-hour total above 0.2 NTU exceeds 5% of 24 hours (or 72 minutes);
     ii. Instantaneous turbidity exceeds 0.5 NTU for 10 seconds.
   - UV system failure, defined as any of the following conditions:
     i. Applied UV dose of less than 80 millijoules/cm^2;
     ii. Filtered effluent UV transmittance of less than 65%.
2. *Description of diversion procedures:*

   Any of the conditions listed above will trigger closing of two motorized butterfly valves located between the UV disinfection system and recycled water storage/distribution. With the butterfly valves closed, flow is diverted back to the headworks via a dedicated connection. The butterfly valves are locked closed until reset by an operator.
3. *Description of diversion area, including capacity, holding time and return capabilities:*

   The diversion area for recycled water that does not meet Title 22 specifications is the headworks. Flow that is diverted to the headworks is sent via a dedicated connection and does not have the possibility of being returned for retreatment to Title 22 specifications.
4. *Plan for disposal or treatment of any inadequately treated effluent*

   Effluent that meets the requirements of disposal but does not meet Title 22 specifications will be percolated into the groundwater basin for disposal.
5. *Description of plans for activation of supplemental supplies (if applicable)*

   See "Supplemental Water Supplies" section (Section 2.4).
6. *Description of failsafe features in the event of a power failure*

   In the event of a power failure, the standby diesel generator will initiate operation to maintain continuous production of tertiary effluent.
7. *Plan for notifying the recycled water users, regional board, state and local health departments, and other agencies of any treatment failures that could result in delivery of inadequately treated recycled water to the use area.*
   - Notification to Users: Malibu staff will contact the list of use site supervisors within 24 hours of a known treatment plant failure.
   - Notification of RWQCB and DPH Staff: Notification of a facility shutdown or treatment failure shall be done in accordance with the provisions of the CCWTF's Master Reclamation Permit.

4 Recycled Water Transmission and Distribution Systems

4.1 Distribution System

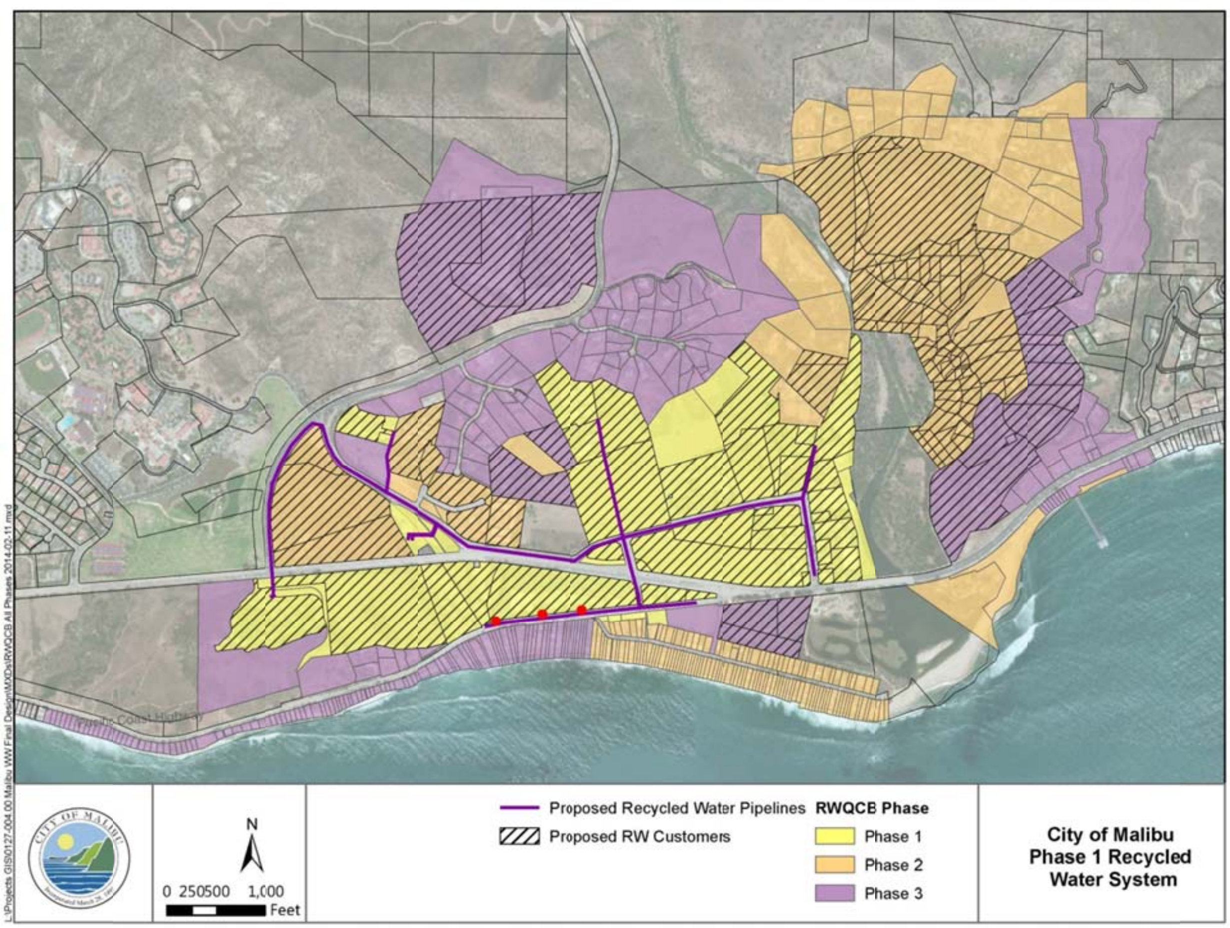
An overview of the recycled water pipelines are shown in Figure 4-1. As discussed in Section 1, both recycled water and sewer collection system pipelines are being constructed by the City of Malibu as part of the process of centralizing wastewater collection and treatment in the City's Civic Center Area.

The initial phase of the CCWTF will serve the customers included in the Phase 1 areas shown in Figure 4-1. These are primarily commercial properties. As additional treatment capacity is added to the CCWTF, Phase 2 and Phase 3 customers will be added to the distribution system. The pipelines shown in Figure 4-1 will serve the Phase 1 customers. The distribution system to serve Phase 2 and 3 customers is not currently developed and is not shown in the figure. As stated previously, supplemental Engineer's Report(s) will be developed when these subsequent phases are undertaken.

At the present, the anticipated phasing of the recycled water distribution system pipelines is as follows:

- Phase 1 – 2015
- Phase 2 – 2019
- Phase 3 – 2025

Figure 4-1: Recycled Water Distribution System



4.2 General Pipeline Design Criteria for Separation and Identification

The general recycled water pipeline design criteria are summarized in Table 4-1. Standard details for recycled water customer connections are included in the recycled water and sewer collection system design plans which are included in Appendix A. A memorandum documenting pipeline separation requirements in detail is included in Appendix B. This memorandum has already been submitted to CDPH for review and CDPH approval has been received by the City.

Table 4-1: Pipeline Design Criteria

Criteria	Requirement
Vertical (crossing) separation	• 12 inches below the bottom of potable water main • Crossings of potable and non-potable lines shall be perpendicular • RW lines shall be designed to cross under potable water mains and above sanitary sewers
Horizontal (parallel) separation	• 10 feet separation from, and 1 foot lower than, potable waterlines •
Field Identification	• Using purple-colored PVC C900 pipe (purple - Pantone 512) with wording: "RECYCLED WATER: DO NOT DRINK" printed on opposite sides of the pipe at 10-foot intervals; pipe shall be laid with the wording facing upwards. • Warning tape with a minimum width of 75 mm (3 inches) reading: "RECYCLED WATER: DO NOT DRINK" (in black lettering on purple background) shall be run continuously on top of all pipe and shall be attached to pipe with plastic tape banded around the warning tape and the pipe every 1.5 m (5 ft) on center.

4.3 Other Utilities in the Area – Potable Water Services

There are existing potable water lines in the vicinity of the recycled water distribution system. The water pipelines are owned and operated by Los Angeles County Waterworks District 29, a special district governed by the Los Angeles County Board of Supervisors. The water pipelines are shown on the recycled water and sewer collection system design plans, which are included in Appendix A. Separations from the potable water mains are per the design criteria presented in Table 4-1 and as summarized in the pipeline separation requirements included in Appendix B.

5 Use Areas

5.1 Use Types

Sections 60303 through 60307 of Title 22 outline the various allowable uses for recycled water. Of these allowable uses for recycled water, the types of uses proposed for the City of Malibu Phase 1 service area are:

- Irrigation (landscaping)
- Dual Plumbed Use Areas

5.2 Proposed Users

The proposed users, shown by implementation phase, are summarized in Table 5-1.

Table 5-1: Proposed Users

Phase	Development Name	Use Type
1	Malibu City Hall	Irrigation
1	LA County Offices	Irrigation
1	Malibu Country Mart	Irrigation
1	Malibu Country Mart	Irrigation
1	Professional Arts Building	Irrigation
1	J&P Limited	Irrigation
1	Drug Store	Irrigation
1	Malibu Legacy Park	Irrigation
1	Miramar Properties	Irrigation
1	GTE Bldg.	Irrigation
1	Stone/Masonry Yard	Irrigation
1	Masonry Yard	Irrigation
1	SoCal Edison	Irrigation
1	Malibu Creek Plaza	Irrigation
1	Shell Station	Irrigation
1	Malibu Lumber Yard	Irrigation & Dual Plumbed
1	Prudential Realty	Irrigation
1	Malibu Colony Plaza	Irrigation
1	Post Office	Irrigation
1	Former Gas Station	Irrigation
1	PCH Landscaping	Irrigation
1	Cross Creek Road Landscape	Irrigation
1	Malibu Bluffs Park	Irrigation
1	Our Lady of Malibu Church/ School	Irrigation
1	Proposed La Paz Ranch - Parcel A	Dual Plumbed
1	Proposed La Paz Ranch - Parcel B	Irrigation
1	Proposed Whole Foods	Irrigation & Dual Plumbed
1	Vacant - Upper Yamaguchi	Irrigation & Dual Plumbed
1	Vacant - Ioki	Irrigation & Dual Plumbed
1	Crummer Development	Irrigation
2	Webster Elementary School	Irrigation
2	Serra Retreat	Irrigation
2	Sycamore Farms Polo Fields	Irrigation
2	Serra Area Homes	Irrigation

Phase	Development Name	Use Type
2	Malibu Canyon Village HOA (23901 Civic Center Way)	Irrigation
2	Vista Pacifica HOA (3601 Vista Pacifica)	Irrigation
2	Maison DeVille HOA (23900 De Ville Way)	Irrigation
2	Toscana (DeVille Way)	Irrigation
2	Rancho Malibu Hotel Development	Irrigation
3	Perenchio Golf Course	Irrigation
3	Allied Nursery	Irrigation
3	Malibu Lagoon State Beach - Overlook	Irrigation
3	Hughes Research Lab	Irrigation & Dual Plumbed
3	Serra Area Homes	Irrigation
3	Vacant - Lower Yamaguchi	Irrigation & Dual Plumbed
3	Vacant - Island	Irrigation

5.3 Rules and Regulations

5.3.1 Recycled Water User Manual

The City of Malibu is using the *Recycled Water Urban Irrigation User Manual* (User Manual) developed by the Los Angeles County Recycled Water Advisory Committee, a local chapter of the California Section of the WateReuse Association, as the basis of their recycled water program manual. This manual covers urban irrigation uses of recycled water; a copy of this document is included as Appendix C.

For dual plumbed use sites, a separate Engineer's Report will need to be developed by each site. These individual Engineer's Reports serve as the onsite user's manual for each dual plumbed use site.

5.3.2 Recycled Water Use Permit

The City of Malibu will issue Recycled Water Use Permits to customers to ensure user compliance with recycled water regulations. The permit application requires the proposed user to provide a Use Site Supervisor. The Use Site Supervisor has the primary responsibility for ensuring the safe use of recycled water at a given site. The draft Recycled Water Use Permit is included in Appendix D.

5.3.3 Use Area Design

Section B "Design & Construction" and Section D "Marking & Equipment" of the User Manual (Appendix C) provide direction to use sites for the design of onsite facilities, including how to properly mark above- and below-grade piping, valves, and sprinkler heads, as well as how to place site signage.

5.3.4 Cross Connection Testing and Procedures

Section E "Cross-Connection Control" of the User Manual (Appendix C) provides procedures for the initial and final cross-connection tests for facility startup and the procedures for periodic cross-connection testing.

5.3.5 Use Area Inspections and Monitoring

Use Site Supervisors are responsible for regulating and monitoring the distribution and use of recycled water at their sites. The User Manual (Appendix C), and the subsequent permit issued to the user, defines the regulations and procedures for each user. The User Manual includes a Site Inspection Report form that allows for documentation of inspections and the conditions found onsite.

5.3.6 Employee Training

The City of Malibu will provide Use Site Supervisor training through a partnership with the Sanitation Districts of Los Angeles County. This training covers the User Manual content, which will be available to the Use Site Supervisors in an electronic format for printing and distribution. Use Site Supervisors are responsible for training personnel at their sites.

5.3.7 Emergency Procedures and Notifications

In the event of an emergency involving the recycled water system, users are instructed to contact the City via telephone immediately. Use Site Supervisors should also initiate the Emergency Cross-Connection Response Plan steps outlined in Section E "Cross-Connection Control" of the User Manual (Appendix C).

6 References

California Department of Health Services. 2001. *Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water*. Sacramento, CA. State of California.

Los Angeles WateReuse. 2014. *Recycled Water Urban Irrigation User Manual*.