Engineering Report for Dry-Weather Runoff, Reclamation, Storage, Pumping, Distribution, and Nonpotable Water Use Area Facilities
Engineering Report for Dry-Weather Runoff, Reclamation, Storage, Pumping, Distribution, and Nonpotable Water Use Area Facilities

City of Santa Monica

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# Table of Contents

**Executive Summary**

- Project Summary ........................................................................................................... ES-1
- Report Organization ......................................................................................................... ES-2
- Conclusions and Recommendations .................................................................................. ES-3
- Future Nonpotable Water Use Expansion ........................................................................ ES-3
- Draft Report Review by Department of Health Services .................................................... ES-3

**Section 1 Introduction and Background**

1.1 Project Description .......................................................................................................... 1-1
1.2 Report Purpose ................................................................................................................ 1-2

**Section 2 Regulatory Compliance Matters**

2.1 California Department of Health Services ..................................................................... 2-1
2.2 Los Angeles Regional Water Quality Control Board (RWQCB) .................................. 2-3
2.3 Recommendation ............................................................................................................ 2-4

**Section 3 Storm Drain Water Sources, Pumping and Pipe Conveyances to Dry-Weather Runoff Reclamation Plant**

3.1 General .......................................................................................................................... 3-1
3.2 Pico-Kenter Pumping Station ....................................................................................... 3-1
3.3 Pipe Conveyance from the Pico-Kenter Pumping Plant to the Dry-Weather Runoff Reclamation Plant ........................................................................ 3-1
3.4 Flow Rate From Pico-Kenter Storm Drain .................................................................. 3-3
3.5 Pier Storm Drain Pumping Station ................................................................................. 3-3
3.6 Flow Rate From the Pier Storm Drain .......................................................................... 3-3
3.7 Pipe Conveyance from Pier Storm Drain Pumping Station to Dry-Weather Runoff Reclamation Plant ............................................................ 3-4

**Section 4 Dry-Weather Runoff Reclamation Facility, Treated Water Storage Reservoir, and Effluent Pumping Station**

4.1 General .......................................................................................................................... 4-1
4.2 Raw Water Quality and Treatment Goals ................................................................. 4-1
4.3 Plant Redundancy ......................................................................................................... 4-3
4.4 Supplemental Water Supply ......................................................................................... 4-4
4.5 Treatment Processes ................................................................. 4-4
  4.5.1 Preliminary Treatment ...................................................... 4-5
  4.5.2 Flow Equalization .............................................................. 4-9
  4.5.3 Physical Treatment and Filtration ..................................... 4-10
    4.5.3.1 Alum/Polymer Coagulation ....................................... 4-10
    4.5.3.2 Dissolved Air Flotation ........................................... 4-11
    4.5.3.3 Microfiltration ....................................................... 4-11
    4.5.3.4 Physical Treatment Equipment Summary ........................ 4-12
  4.5.4 Ultraviolet (UV) Disinfection and Postchlorination .......... 4-13
  4.5.5 Treated Water Storage Facility ........................................ 4-15
  4.5.6 Treated Water Pumping Facilities ................................... 4-15
  4.5.7 Raw and Treated Water Quality Monitoring ..................... 4-15
  4.5.8 Potable Water Service to DWRFF ..................................... 4-15
  4.5.9 Landscape Irrigation With Nonpotable Water .................... 4-15

Section 5 Nonpotable Water Distribution System

  5.1 General ............................................................................. 5-1
  5.2 Description of Nonpotable Water Distribution System ........ 5-3
    5.2.1 Segment from Dry-Weather Runoff Reclamation Facility to Ocean Avenue and then to Colorado Avenue ......................... 5-3
    5.2.2 Segment from Ocean Avenue and Colorado Avenue to Palisades Park at Arizona (Palisades Park Lateral) .............................. 5-3
    5.2.3 Segment from Ocean Avenue and Colorado Avenue to Colorado Avenue and Palm Court ......................................................... 5-3
    5.2.4 Palm Court Lateral ......................................................... 5-3
    5.2.5 Segment from Colorado Avenue and Palm Court to Colorado Avenue and 11th Street ................................................................. 5-5
    5.2.6 Segment from Colorado Avenue and 11th Street to 11th Street and Olympic................................................................. 5-5
    5.2.7 Segment from 11th Street and Olympic to 17th Street and Olympic .................................................................................. 5-5
    5.2.8 Segment from 17th Street and Olympic to 17th Street and Delaware .................................................................................. 5-7
    5.2.9 Segment from 17th Street and Delaware Avenue to 15th Court and Delaware ................................................................. 5-7
    5.2.10 Segment in 15th Court West of Delaware .......................... 5-7
  5.3 Water Quality Monitoring in Nonpotable Water Distribution System ................................................................. 5-7
Section 6 Nonpotable Water Use Areas

6.1 General ................................................................................................................. 6-1
6.2 On-Site Reviews ................................................................................................. 6-1
6.3 Palisades Park ...................................................................................................... 6-1
   6.3.1 Site Description ......................................................................................... 6-1
   6.3.2 Retrofit Modifications ............................................................................. 6-4
6.4 Memorial Park ..................................................................................................... 6-5
   6.4.1 Description of Site .................................................................................. 6-5
   6.4.2 Hose Bibs .................................................................................................. 6-8
   6.4.3 Retrofit Modifications ............................................................................. 6-8
6.5 Woodlawn Cemetery ......................................................................................... 6-10
   6.5.1 Description of Site .................................................................................. 6-10
   6.5.2 Recent Internal Plumbing Modifications West of Delaware Avenue ..... 6-13
   6.5.4 Water Service East of Delaware Avenue Before and After Retrofit ..... 6-16
   6.5.5 Other Retrofit Modification ................................................................... 6-16
6.6 City Hall/Civic Center ......................................................................................... 6-18
6.7 Olympic Boulevard Medians ............................................................................ 6-22
6.8 Santa Monica Freeway – Caltrans Right-of-Way ................................................ 6-25
6.9 Final Retrofit Confirmation ............................................................................... 6-27

Figures

1-1 Nonpotable Water System .................................................................................. 1-3
3-1 8" Force Main from P/K Pump Station to DWRRF ............................................ 3-2
4-1 Schematic Diagram for DWRRF ....................................................................... 4-4
4-2 Treatment Process Flow Schematic .................................................................. 4-5
4-3 Hydraulic Profile of DWRRF ............................................................................ 4-6
5-1 Nonpotable Water Distribution System and Irrigation Connections ............... 5-2
5-2 Palisades Park/City Hall Connections ................................................................ 5-4
5-3 Caltrans/Olympic Median Connections ............................................................ 5-6
5-4 Memorial Park Connections ............................................................................. 5-8
5-5 Woodlawn Cemetery Connections .................................................................. 5-9
6-1 Palisades Park .........................................................................................................................6-2
6-2 First Phase of Palisades Park .................................................................................................6-3
6-3 Memorial Park Connections .................................................................................................6-7
6-4 Site Map of Woodlawn Cemetery ........................................................................................6-11
6-5 Woodlawn Cemetery Water Piping, Meters, and Backflow Prevention...............................6-12
6-6 Woodlawn Cemetery Irrigation System Modifications West of Delaware Ave. ..................6-14
6-7 Woodlawn Cemetery Irrigation System West of Delaware After Retrofit ............................6-15
6-8 Woodlawn Cemetery Irrigation Water Service East of Delaware Before/After Retrofit ......6-17
6-9 City Hall - Irrigated Areas .....................................................................................................6-19
6-10 City Hall Water Saving Modifications .................................................................................6-21
6-11 Olympic Boulevard Medians .............................................................................................6-24
6-12 Existing Santa Monica Freeway Irrigation Water Connection ............................................6-26

Tables
4-1 Raw Water Quality and Treatment Goals for Dry-Weather Runoff Reclamation Facility ....4-2
4-2 Recommended Water Quality Monitoring Plan for Dry-Weather Runoff Reclamation Facility ........................................................................................................................................4-16
Executive Summary

Project Summary

This report was prepared in compliance with Section 60323, Title 22 of the California Code of Regulations for submission to the Drinking Water Field Operations Branch of the California Department of Health Services (DHS) in Los Angeles, the Los Angeles County Environmental Health Department, and the Regional Water Quality Control Board office in Los Angeles.

This report was prepared to describe and document currently proposed nonpotable water uses involving initially only urban landscape irrigation. Additional engineering reports will be prepared and supplied to DHS before future reclaimed water system use areas are supplied with nonpotable water, such as for toilet and urinal flushing in public restrooms and/or additional irrigation uses.

Tertiary treated dry-weather runoff effluent will be produced and conveyed by the City of Santa Monica to the following locations for landscape irrigation purposes:

- A three-block section of Palisades Park
- City Hall in Civic Center (later phase)
- A section of the Santa Monica Freeway (Caltrans)
- Olympic Boulevard medians
- Memorial Park
- Woodlawn Cemetery

The wastewater for this project is dry-weather runoff obtained from several storm drains that discharge into Santa Monica Bay and the Pacific Ocean. These discharges have occasionally caused bacteriological contamination problems on nearby beaches. The water diverted from these storm drains will receive the following treatment:

- Flow equalization (300,000 gallons)
- Screening to remove larger objects
- Grit removal
- Chemical coagulation (using a primary coagulant and a polymer)
- Dissolved air flotation
- Microfiltration
- UV disinfection
- Chlorination

This reclamation facility is designed for a flow of 0.5 MGD with a peak flow rate of 0.75 MGD. The primary method of disinfection will be performed using ultraviolet light. Chlorination may be practiced...
for purposes of maintaining a chlorine residual in the distribution system. Chlorination treatment may be sporadic or continuous, depending on need.

The treated water will be stored in a 200,000-gallon reservoir from which it will be pumped into a nonpotable water distribution system consisting of piping varying from 4 to 12 inches in diameter.

Initially, there will be 15 connections for landscape irrigation purposes as shown below:

- Palisades Park: 1 connection
- City Hall (later phase): 1 connection
- Caltrans: 3 connections
- Olympic Boulevard median: 6 connections
- Memorial Park: 2 connections
- Woodlawn Cemetery: 2 connections

It is proposed to monitor the water involved in this project at the following locations:

- Raw water – before treatment
- Treated water – after treatment and in the distribution system

The exact sampling locations will be identified in a water quality monitoring plan to be prepared at a later date. The 200,000-gallon treated water storage reservoir will have an airgapped potable water makeup line from the City’s domestic water system. This makeup line will be utilized under the following possible scenarios:

- The reclamation plant is inoperative for some reason
- The effluent quality produced by the plant is unsuitable for reuse
- The TDS in the treated water is too high for Basin Plan compliance
- The average reuse demand exceeds 0.5 MGD
- The peak reuse demand exceeds 0.75 MGD

All of the initial target use areas already exist and currently use potable water from the City water system for irrigation. This project is therefore a water conservation and a water pollution control project.

Report Organization

Section 1 provides an introduction and background information for this project.

Section 2 provides information regarding regulatory compliance of this project, including permitting requirements of the Los Angeles Regional Water Quality Control Board.

Section 3 provides information on the raw water for this project and how this water is pumped and conveyed to the dry-weather runoff reclamation facility (DWRRF).
Section 4 provides information on the components of the DWRRF and how the raw/treated water will be monitored for key water quality parameters. Data is also provided for the treated water storage and pumping facilities.

Section 5 provides information on the nonpotable water distribution system, its makeup, proximity to sanitary sewers, valve appurtenances, and service connection retrofits. It also provides information on how “delivered” water quality will be monitored in the distribution system.

Section 6 provides detailed information about each nonpotable water use area and the specific retrofit features to be provided at each location.

Conclusions and Recommendations

- The dry-weather runoff effluent from the City’s new reclamation plant will consistently meet the quality requirements for the intended landscape irrigation water uses. When the TDS in the water is excessive, the treated water will be blended with domestic water to meet Basin Plan objectives.

- The proposed nonpotable water storage, pumping, and conveyance facilities owned and operated by the City comply with the guidelines currently recommended by the California State Department of Health Services and the American Water Works Association.

- The proposed project for the six targeted nonpotable water use areas should be approved subject to the implementation of the described use area safeguards and water quality monitoring provisions contained in Sections 4, 5, and 6 of this report.

- The City of Santa Monica should proceed with completing the permit requirements described in Section 2 of this report and obtain “Reclamation Requirements.” The application for obtaining these Reclamation Requirements will need to include this report and a water quality monitoring plan for the reclamation plant (raw and treated water) and for the nonpotable water distribution system.

Future Nonpotable Water Use Expansion

The City of Santa Monica will prepare supplemental engineering reports for any and all additional nonpotable water uses to be added in the future.

Draft Report Review by Department of Health Services

The draft version of this report was submitted DHS in April 1999 and reviewed by them. Their review comment letter was sent to the City of Santa Monica on September 8, 1999. A copy of this letter is attached at the end of the Appendix in this final report.
The DHS review comments are self explanatory. The City intends to comply with the six DHS recommendations outlined in the September 8, 1999 letter. Also, this final report addresses and incorporates the DHS comments. The project will comply with the City of Santa Monica's Cross-Connection Control Ordinance No. 1385CCS adopted by the City on September 9, 1986.
Section 1
Introduction and Background

1.1 Project Description

The City of Santa Monica (City) is in the process of constructing a reclaimed water system using treated, dry-weather runoff obtained from the Pico-Kenter and Pier storm drains. Dry-weather runoff will be conveyed by means of a pumping plant at Pico Boulevard off the Pico-Kenter storm drain to a dry-weather runoff reclamation plant located on the northwest corner of Moss Avenue and Appian Way. A second pumping station is located on the Pier storm drain near the Santa Monica pier and the location of the reclamation plant.

These storm drains have historically discharged into the Pacific Ocean near the Santa Monica pier and caused bacteriological water quality problems in the surf waters used for body contact sports and shellfishing (clams) by the public. The maximum allowable bacteriological level allowed for saltwater body contact sports areas is a total coliform bacteria count of 1,000 MPN/100 mL. When the count exceeds this limit, the beaches much be posted, prohibiting public recreation in the ocean water.

The City is currently diverting these dry-weather storm drain flows into the city of Los Angeles sewer collection system that drains toward the Hyperion Wastewater Reclamation plant.

Discharging this dry-weather runoff into the city of Los Angeles sewer system has become increasingly costly. Therefore, the City has decided to construct and operate a 0.5-MGD dry-weather runoff reclamation plant and a nonpotable water storage/pumping/distribution system for urban landscape irrigation purposes. This report will describe this new system and how it will be monitored, operated, and controlled to avoid the creation of public health hazards by the proposed urban landscape irrigation/disposal of the treated storm water.

The nonpotable water system that will be described in this report will consist of the following components:

- Raw water source facilities
- Dry-weather runoff reclamation plant
- Treated water storage reservoir and pumping station
- Nonpotable water transmission/distribution system
- Nonpotable water use areas

This nonpotable water project will result in the conservation of potable water now used for the irrigation water uses at the following facilities within the city of Santa Monica:

- Palisades Park
• Memorial Park
• Woodlawn Cemetery
• City Hall area (Civic Center) – later phase
• Olympic Boulevard medians
• Santa Monica Freeway/right-of-ways

The landscaping of the above-outlined areas are now using potable water for irrigation. The nonpotable water uses will therefore result in potable water conservation. Irrigation water required in excess of the daily reclaimed water supply will be provided by a potable water makeup line, which is airgapped into the treated reclaimed water storage reservoir located at the storm water reclamation plant. The fully treated wastewater will be pumped from the treated water storage reservoir into a reclaimed water distribution system.

The City has considered the possibility of also using the nonpotable water for toilet/urinal flushing in public restrooms located at several city parks to be retrofitted for using nonpotable water for landscape irrigation. The use of nonpotable water for toilet/urinal flushing is not proposed at this time. This may be proposed to DHS in the future, at which time a supplemental engineering report will be prepared to describe specific retrofit features to be provided.

The initial locations where nonpotable water use for toilet/urinal flushing may be proposed in the near future are as follows:

• The Water Garden development at Olympic and Cloverfield
• The new public safety facility to be built near City Hall
• City public restrooms along the Promenade
• City public restrooms in Palisades Park

Additional landscape irrigation areas may also be proposed in the future such as Santa Monica High School and the Water Garden development. The locations of the dry-weather runoff reclamation facility, the nonpotable water distribution system pipelines, and the nonpotable water use areas are shown on Figure 1-1.

1.2 Report Purpose

The State of California Department of Health Services (DHS) regulates nonpotable water uses where the wastewater involved is an effluent from a domestic wastewater (sewage) reclamation plant. The DHS regulations used to do this are called “Wastewater Reclamation Criteria” contained in Title 22 of the California Code of Regulations. The Wastewater Reclamation Criteria do not include dry-weather runoff as a nonpotable water source.

The use of nonpotable water using dry-weather runoff as the water source is currently unregulated in terms of being controlled by specific recommendations. However, the two regulatory agencies involved
in permitting nonpotable water projects involving domestic wastewater sources do have an interest in this specific project.

- DHS wants to make sure that the various use areas using this nonpotable storm drain water for landscape irrigation will not cause cross connections into:
  - The internal drinking water plumbing systems
  - The City's domestic water supply system

- The Regional Water Quality Control Board want to make sure that the water applied to the vegetation and ground surfaces will not impair groundwater quality.

In a letter dated November 19, 1997, DHS requested the preparation of an Engineering Report for this project. This letter is attached in the Appendix.

The purpose of this report is to comply with the DHS letter request dated November 19, 1997. Regulatory compliance matters will be further explained in Section 2 of this report.
Section 2
Regulatory Compliance Matters

2.1 California Department of Health Services

On October 28, 1997, Boyle prepared a letter to DHS describing the nonpotable water project and asking DHS whether this project will require the submission of a Title 22 Engineering Report as set forth in Section 60323 of the Wastewater Criteria Regulations. This section states the following:

60323. Engineering Report. (a) No person shall produce or supply reclaimed water for direct reuse from a proposed water reclamation plant unless he files an engineering report.

(b) The report shall be prepared by a properly qualified engineer registered in California and experienced in the field of wastewater treatment, and shall contain a description of the design of the proposed reclamation system. The report shall clearly indicate the means for compliance with these regulations and any other features specified by the regulatory agency.

(c) The report shall contain a contingency plan which will assure that no untreated or inadequately-treated wastewater will be delivered to the use area.

This letter (in Appendix) was hand delivered and discussed on October 28, 1997, during a meeting with DHS staff. A follow-up letter was sent to DHS on November 3, 1997 confirming what was discussed during that meeting (see Appendix). DHS responded in a letter dated November 19, 1997 (see Appendix) that an Engineering Report is requested for this project.

Another meeting was held with DHS on January 8, 1998, to discuss the project and the DHS letter to the City dated November 19, 1997. During this meeting, it was decided to prepare a less extensive Engineering Report than normally required by DHS guideline documents (see Appendix). A scope of work was prepared and sent to the City and is outlined below.

1. A short description of the storm water reclamation plant and how it will function, including the airgapped potable water makeup connection into the water storage reservoir. This section will also address how plant operations will be monitored for two water quality constituents (turbidity/coliiform bacteria) of specific concern to DHS in terms of treatment goals and objectives.

2. A short description of the nonpotable water distribution system and the currently targeted nonpotable water use areas.
3. A detailed write-up of each on-site nonpotable water use area describing how and where the design will address the following DHS concerns:

a. Cross connection control for protecting the City water supply system
   (1) Points of disconnections to isolate the internal irrigation piping system
   (2) Points of connection from the on-site irrigation piping systems to the City’s nonpotable water supply system
   (3) Locations where backflow prevention devices will be installed, including sizes and types of backflow prevention devices on potable water service connection(s) into each user’s premises

b. Prevention of accidental drinking from the on-site nonpotable water irrigation piping system
   (1) Elimination of hose bibs
   (2) Purple marking and warning tags at quick-disconnect coupler locations
   (3) Nonpotable water warning signs on all cemetery outlets for flower watering off the irrigation water piping system

c. Identification of existing on-site irrigation system components
   (1) Marking of aboveground timers, controllers, valves, etc., with purple paint and purple warning tags

d. Identification of new on-site irrigation piping system components
   (1) New purple PVC piping or tape identification
   (2) New valves (purple warning tags)

e. On-site separation between potable water and nonpotable water pipeline systems
   (1) Four-foot horizontal separation
   (2) One-foot vertical separation (nonpotable water piping under potable water piping at crossings)

f. General warning sign locations and sign wording
   (1) Protection of the general public and on-site workers
   (2) English/Spanish language

g. Protection of existing drinking fountains
h. Appointment and training of on-site water supervisors
   (1) City staff
   (2) Non-City staff
i. Miscellaneous matters
   (1) Irrigation hours
   (2) Runoff control

4. The nonpotable water use areas that will be covered in this report will include the following:
   a. Portions of Palisades Park
   b. Olympic Boulevard medians
   c. Woodlawn Cemetery
   d. Memorial Park
   e. Civic Center
   f. Caltrans Santa Monica freeway right-of-way between 4th Street and 17th Street

5. The report will not include the following use areas which the City has opted to not connect to the project at this time (these sites may be connected at some future date):
   a. Santa Monica City College
   b. John Adams Middle School
   c. Santa Monica High School
   d. Palisades Park north of Arizona Street
   e. Water Garden development at Olympic Boulevard and Cloverfield

2.2 Los Angeles Regional Water Quality Control Board (RWQCB)

On June 25, 1997, the City and its consultants met with both RWQCB staff and DHS staff to discuss the project. The RWQCB confirmed this meeting in an August 22, 1997 letter (see Appendix) to the City and made the following conclusions and requests:

1. Separate waste discharge requirements will not be required. The DWRRF will be considered as a treatment best management practice to reduce pollutants in dry-weather flows under Board Order No. 96-954.
2. Treated effluent from the DWRRF is required to meet total dissolved solids (TDS) limit of 1,000 mg/L to protect beneficial uses of the Santa Monica groundwater basin, and any other applicable Los Angeles Regional Water Quality Control Plan (Basin Plan) standard.

3. California Title 22 standards for treated sewage, in the absence of reclamation criteria for treated dry-weather runoff, will serve as criteria for the DWRRF. Biological oxidation will not be required because the influent BOD already meets reclamation criteria.

4. The City will develop a monitoring program to ensure that the DWRRF effluent meets water quality and reclamation criteria. The City will work with Regional Board and Los Angeles County Department of Public Works staff to integrate DWRRF monitoring reporting into the Annual Monitoring Report submittal under Board Order No. 96-054.

The above-mentioned monitoring program for the reclamation plant has not yet been developed.

On October 28, 1997, Boyle prepared a letter (copy in Appendix) to the RWQCB describing the nonpotable water project and asking the agency whether a reclamation permit (also called reclamation requirements) will be required for this project. This letter was then hand delivered to the RWQCB during a meeting with their staff. During this meeting, both the project and the inquiry letter were discussed with the executive officer of the RWQCB and key staff. Boyle prepared a second letter to the RWQCB after the meeting to confirm the discussions that took place (see copy in Appendix).

In a response letter from the RWQCB dated December 1, 1997, the City was notified to:

1. Submit a Report of Waste Discharge for issuance of “reclamation requirements.”

2. The Report of Waste Discharge is to include a specific monitoring plan and detailed background and technical support information.

This engineering report will constitute the detailed background and technical support information for this project.

The “specific monitoring plan” for the influent/effluent of the reclamation plant and the resulting waste streams and their disposal has not yet been formulated. A recommended sampling program is included in Section 4 for the influent/effluent of the reclamation plant. Once approved by the RWQCB, the monitoring will need to be implemented by the City of Santa Monica, possibly by the Industrial Waste Section.

2.3 Recommendation

The City should now proceed with satisfying the permit requirements of the RWQCB outlined in their letter of December 1, 1997 (see Appendix).

1. Prepare a Report of Waste Discharge application for Reclamation Requirements. Attach this final project Engineering Report with the application.
2. Prepare a formal Water Quality Monitoring Plan for the following project elements:
   a. Reclamation Plant (see Section 4.5.7 and Table 4-2)
      1) Raw wastewater
      2) Treated nonpotable water
   b. Nonpotable water distribution system (see Section 5.3)

The recommended water quality monitoring program contained in this report should be reviewed and evaluated for possible adoption and acceptance by the RWQCB.
Section 3
Storm Drain Water Sources, Pumping and Pipe Conveyances to Dry-Weather Runoff Reclamation Plant

3.1 General

The dry-weather runoff reclamation plant will receive the pumped flow from two dry-weather runoff lift stations:

- The Pico-Kenter Pump Station pumping water from two storm drains in Pico Boulevard
- The Pier Pumping Station pumping water from the Pier storm drain (located at the DWRRF)

The locations of these two pumping stations and pipe conveyance facilities to the DWRRF are shown on Figure 3-1.

3.2 Pico-Kenter Pumping Station

This newly retrofitted pumping station will convey the dry-weather runoff from two Pico Boulevard storm drains to the dry-weather runoff reclamation plant located on the northwest corner of Moss Avenue and Appian Way north of Pico Boulevard. The pumping station is located in Pico Boulevard, some 50 feet from The Promenade. The pump station includes the following facilities:

- Two 15-hp motor pumping units, each rated at 175 gpm at approximately 75 feet of TDH and 260 gpm at 56 feet of TDH.

- A flow totalizer and a 7-day chart recorder

Each pump has a 4-inch suction and a 4-inch discharge.

3.3 Pipe Conveyance from the Pico-Kenter Pumping Plant to the Dry-Weather Runoff Reclamation Plant

An 8-inch PVC waterline will convey the flow from the Pico-Kenter Pumping Station to the reclamation plant. The 8-inch pipeline will be located in the beach sand generally following the existing concrete bike path extending from the pumping station in a northwesterly direction to the pier. The 8-inch pipe
then routes in Moss Avenue northeasterly to Appian Way to the reclamation plant site as shown in Figure 3-1.

The 8-inch PVC pipeline is about 2,130 feet long. At the beginning, the pipe has an approximate invert elevation of 5 feet. At the end (at the reclamation plant), the invert pipe elevation is about 57 feet. The proximity of this pipeline to other wasteline conduits is not deemed important and was therefore not investigated. There are no domestic waterlines within 10 feet of this raw water wasteline. Just prior to discharging into the headworks of the DWRRF, the 8-inch pipe is joined by the 3-inch force main from the Pier storm drain pump station.

3.4 Flow Rate From Pico-Kenter Storm Drain

The available dry weather flow rates out of the Pico-Kenter storm drain are shown below.

<table>
<thead>
<tr>
<th>Average Day Flow</th>
<th>Peak Day Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>gpd</td>
<td>gpm</td>
</tr>
<tr>
<td>265,000</td>
<td>184</td>
</tr>
<tr>
<td>500,000</td>
<td>347</td>
</tr>
</tbody>
</table>

The design flow for the dry-weather runoff reclamation facility is 0.5 MGD with a peak hydraulic flow of 0.75 MGD. Storm drain flows in excess of 0.75 MGD will be diverted around the Pico-Kenter Pumping Station.

3.5 Pier Storm Drain Pumping Station

This pumping plant is located at the site of the DWRRF. It diverts dry-weather runoff out of the Pier storm drain and pumps it into the DWRRF. It consists of three identical pumps. The average and maximum anticipated flow rates are approximately 70 gpm and 140 gpm, respectively.

3.6 Flow Rate From the Pier Storm Drain

The normal flow rate out of the Pier storm drain pump station is approximately one-quarter of the flow rate out of the Pico-Kenter storm drain pump station, or 70 gpm with one pump running. The amount that can be pumped by using more than one pump depends on the water availability in the storm drain and the size of the pipe discharge.

<table>
<thead>
<tr>
<th>Pump No.</th>
<th>Delivery (gpm – each)</th>
<th>Type</th>
<th>Inlet (inches)</th>
<th>Outlet (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Min 20 @ TDH = 51 feet</td>
<td>Constant speed</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>2</td>
<td>Max 100 @ TDH = 36 feet</td>
<td>Constant speed</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Normal 70 @ TDH = 44 feet</td>
<td>Constant speed</td>
<td>3</td>
<td>3</td>
</tr>
</tbody>
</table>
3.7 Pipe Conveyance from Pier Storm Drain Pumping Station to Dry-Weather Runoff Reclamation Plant

The pipe conveyance from the pump station into the rotating drum screen of the reclamation plant’s headworks facilities is only a few feet. The pipe inlet from this pumping plant is 3 inches in diameter. The reclamation plant inlet line from the Pico-Kenter pumping plant is 8-inches in diameter. The 8-inch and 3-inch pipes join about 10 feet from the rotating screen entrance point.
Section 4
Dry-Weather Runoff Reclamation Facility, Treated Water Storage Reservoir, and Effluent Pumping Station

4.1 General

The facilities to be described in this section are:

- Dry-weather runoff reclamation facility (DWRFF)
- Treated water storage reservoir
- Treated water effluent pumping station

The DWRFF will treat water from the Pico-Kenter and Pier storm drains. The dry-weather runoff (raw water) is mainly composed of runoff from overirrigation and outside water uses such as vehicle washing, washing down concrete sidewalks and driveways, concrete sawcutting operations, runoff from construction sites, and other activities requiring the use of water. Minor components include dumping water from swimming pools, foundation drainage, watermain breaks, fire hydrant flushing and testing, etc.

The historical dry-weather runoff flows in the Pico-Kenter and Pier storm drains range from as low as 50,000 gallons to over 750,000 gallons. The reclamation plant will have the following design values:

- 0.5 MGD average flow
- 0.75 MGD peak flow

Flows in excess of 0.75 MGD will not be handled by the plant. Instead these flows will be discharged to the ocean. The treated water will be used initially only for landscape irrigation.

4.2 Raw Water Quality and Treatment Goals

Shown on Table 4-1 are the design average concentrations and the finished water quality criteria. The finished water quality will meet the turbidity and total coliform bacteria requirements for unrestricted recreation as outlined in DHS’s Wastewater Reclamation Criteria. The finished water will also need to meet the 1,000-mg/L total dissolved solids (TDS) requirement contained in the Los Angeles Regional Water Quality Control Plan.

At times the untreated storm water may contain pesticides and/or trace metals. The treatment processes to be constructed initially will not remove pesticides, trace metals, or TDS. Provisions have been made
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Raw (Source) Water Design Average Concentrations</th>
<th>Finished Water Quality Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Average</td>
<td>Maximum</td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>18.5</td>
<td>23.9</td>
</tr>
<tr>
<td>Oil and grease</td>
<td>mg/L</td>
<td>5.4</td>
<td>12</td>
</tr>
<tr>
<td>pH</td>
<td>units</td>
<td>8.1</td>
<td>8.1</td>
</tr>
<tr>
<td>Turbidity</td>
<td>ntu</td>
<td>22</td>
<td>83</td>
</tr>
<tr>
<td>Total suspended solids</td>
<td>mg/L</td>
<td>103</td>
<td>--</td>
</tr>
<tr>
<td>Biochemical oxygen demand</td>
<td>mg/L</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>Total dissolved solids</td>
<td>mg/L</td>
<td>870</td>
<td>6,000</td>
</tr>
<tr>
<td>Alkalinity</td>
<td>mg/L</td>
<td>266</td>
<td>370</td>
</tr>
<tr>
<td>Hardness</td>
<td>mg/L</td>
<td>287</td>
<td>15,000</td>
</tr>
<tr>
<td>Conductance</td>
<td>µmhos</td>
<td>1,310</td>
<td>10,000</td>
</tr>
<tr>
<td>Total coliform</td>
<td>MPN/100 mL</td>
<td>250,000</td>
<td>3,300,000</td>
</tr>
<tr>
<td>Fecal coliform</td>
<td>MPN/100 mL</td>
<td>15,000</td>
<td>160,000</td>
</tr>
</tbody>
</table>
in the plant’s design to later add reverse osmosis treatment and reverse osmosis pretreatment facilities should this become necessary. In the interim, it is proposed to periodically monitor the plant effluent for pesticides, trace metals, and other parameters. This sampling will be defined in a water quality monitoring plan to be prepared at a later date. The plant effluent will either be directed into a nearby sanitary sewer or to the ocean during periods when the effluent quality does not meet reuse requirements. An alternative source of irrigation water will be furnished into the plant’s treated water storage reservoir during such bypassing periods. Also, during normal plant shutdowns (for maintenance and repair), the dry-weather runoff from both storm drains will be diverted into the nearby sewer system, as is presently the case, or to the ocean.

The raw water quality, such as volatile organics or solvents, can also be impacted. The technology to perform online continuous monitoring of these constituents is currently developed to the level needed for this project but is not yet proven technology that can be consistently relied upon. Consequently, a manual monitoring and bypassing procedure will be implemented by the City such that discovery of a spill or illegal discharge will result in the plant bypassing of seriously contaminated water, as the treatment processes to be provided cannot remove such substances. The use of a detection/alarm system on the plant influent may also be considered.

4.3 Plant Redundancy

The reclamation plant facilities will not be equipped with a great deal of reliability features because of a great number of flexible operational features.

- If a plant shutdown is required for any reason, the two influent pumping stations will be deactivated, and the raw water flows will remain in the storm drains then being conveyed either into the local sanitary sewer or to the ocean.

- If the treated water storage reservoir is full, the reclamation plant can either be shut down or normal practice will be to allow the reservoir to overflow to the ocean if the use areas are not demanding water.

- If the treated water pumping station for any reason is not operable, the reclamation plant can either be shut down or normal practice will be to allow or the treated water storage reservoir to overflow into the ocean.

Raw water TDS levels may occasionally exceed the finished water quality goal of <1,000 mg/L. The following mitigation measures will be used:

- If the TDS is <1,000 mg/L, the treated water will be beneficially used for irrigation.

- If the TDS is between 1,000 and 1,500 mg/L (EC between 1,600 and 2,200 mmhos), the treated water will be blended with water from the potable water system to result in a TDS of <1,000 mg/L before the water leaves the treated water storage tank.
• If the TDS is >1,500 mg/L, the treated water will be discharged to the ocean and not beneficially used.

Salinity in the raw and treated water will be continuously monitored with a conductivity meter/ recorder.

### 4.4 Supplemental Water Supply

This project will not permit any nonpotable water use area to use the current domestic water system as a standby or supplemental water supply source. All physical connections to the City’s potable water system will therefore be permanently disconnected in such a way that reconnection cannot again be made, for example by inserting a spool in a preengineered “removable spool” piping configuration incorporating a backflow prevention device.

The only backup supplemental water source will be an airgapped connection from the City’s potable water system into the treated water storage tank located at the DWRRF. Also, the domestic water service line into the DWRRF will be equipped with an approved RPP backflow prevention device.

### 4.5 Treatment Processes

The treatment processes to be provided are shown schematically on Figures 4-1, 4-2, and 4-3. The treatment processes are as follows:

• Preliminary Treatment
  - Screening
  - Grit removal

• Flow Equalization

• Physical Treatment
  - Rapid mix/polymer addition
  - Dissolved air flotation

• Filtration
  - Zenon ZeeWeed microfiltration

• Disinfection
  - Ultraviolet radiation
  - Sodium hypochlorite (chlorine residual)
Notes: Chemical Coagulation @ 4
UV = Ultraviolet Light Disinfection
4.5.1 Preliminary Treatment

The raw water will receive coarse screening to remove larger particles at each of the two pumping stations. Finer screens will be the first treatment process at the DWRRF. This screening will remove smaller particles passed by the coarser screens at the raw water storm drain pumping stations. Also, these pump stations use pumps capable of passing up to 3-inch solids.

The Pico-Kenter pump station will be equipped with a screen/cyclone combination device to improve the raw water diverted out of the storm drains. The raw water enters a vortex chamber that causes the water to rotate around the tank. The center of the tank is relatively still, which allows debris, such as heavy particles, sand and grit to settle to the bottom of the tank. The chamber is configured with an inner wall made of wire mesh. This mesh screens out larger particles and floating solids. The screened water passes through the mesh. Floating material stays on the surface and must be skimmed off. The settled materials can be pumped using a vacuum truck.

The DWRRF will be equipped with a rotating screen and cyclone-type grit chamber. The rotating drum screens will be sized to remove smaller particles and debris passed by the preliminary treatment facilities at the Pico-Kenter storm drain pumping station. The grit chamber will be designed to remove sand and grit from the raw water. The removed screenings and grit will be combined in a tank and pumped to the nearby Moss Avenue Pump Station.

The anticipated “in and out” water qualities are to be as shown below.

<table>
<thead>
<tr>
<th>Flow</th>
<th>At Average Flow</th>
<th>At Peak Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>QA (MGD)</td>
<td>TSS (mg/L)</td>
</tr>
<tr>
<td>Inflow</td>
<td>0.5</td>
<td>103</td>
</tr>
<tr>
<td>Outflow</td>
<td>0.5</td>
<td>103</td>
</tr>
</tbody>
</table>

TSS = Total suspended solids (not removed by preliminary treatment)

The preliminary treatment process will produce the following solid waste streams:

<table>
<thead>
<tr>
<th></th>
<th>Average Q = 0.5 MGD</th>
<th>Peak Q = 0.75 MGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screenings (ft³)</td>
<td>3.75</td>
<td>5.63</td>
</tr>
<tr>
<td>Grit (ft³)</td>
<td>1.25</td>
<td>1.88</td>
</tr>
</tbody>
</table>

The sizing criteria for the preliminary treatment equipment is as follows:

- Screening
  - Screenings generated: 7.5 ft³/MG
  - Screen size: 0.08 inch
  - Hydraulic loading rate: 10 to 30 gpm/ft²
  - Maximum allowable headloss: 6 inches
• Grit Removal
  - Grit production: 2.5 ft$^3$/MG

The equipment to be provided is outlined below.

• Rotating Drum Screen
  - Quantity: 1
  - Type: Internal feed
  - Capacity: 525 gpm
  - Inlet size: 16 inches
  - Screen size: 0.08 inch
  - Maximum headloss: 6 inches
  - Horsepower: 0.5 hp

• Grit Chamber
  - Quantity: 1
  - Type: Cyclone
  - Inlet channel width: 12 inches
  - Horsepower: 0.75 hp

• Grit Pump
  - Quantity: 1
  - Type: Turbo Pistagrit
  - Capacity: 200 gpm
  - Horsepower: 5 hp

4.5.2 Flow Equalization

The water quality from storm drains varies in quality and quantity. Flow equalization basins stabilize both varying inflow rates and have a tendency to blend and average incoming water quality constituents.

The DWRRF will have a 300,000-gallon flow equalization basin. This facility will have the following sizing criteria:

• Equalization Tank
  - Maximum water depth: 15 feet
  - Tank volume: 40,100 ft$^3$ (300,000 gallons)
  - Tank surface area: 2,675 ft$^2$
The equipment to be furnished is as follows:

- **Equalization Tank**
  - Quantity: 1
  - Dimensions: 60 feet long x 35 feet wide
  - Side water depth: 20 feet
  - Volume: 300,000 gallons

### 4.5.3 Physical Treatment and Filtration

After flow equalization, the water will be treated in an air flotation unit. Before dissolved air flotation, the water will be coagulated with alum and/or a polymer and then treated with a microfiltration unit. The purpose of this physical treatment is to remove mainly total suspended solids, not dissolved BOD, which would require biological treatment followed by filtration.

The “in and out” water qualities are anticipated to be shown below.

<table>
<thead>
<tr>
<th>Flow</th>
<th>At Average Flow</th>
<th>At Peak Flow</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>QA (MGD)</td>
<td>TSS (mg/L)</td>
</tr>
<tr>
<td>Inflow</td>
<td>0.5</td>
<td>101</td>
</tr>
<tr>
<td>Outflow</td>
<td>0.5</td>
<td>20/5&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>1</sup>After DAF/microfiltration treatment.

#### 4.5.3.1 Alum/Polymer Coagulation

Before dissolved air flotation, the water is coagulated with alum and/or polymer to aid in the sedimentation/filtration process that follows. The sizing criteria for this equipment is as follows:

- **Chemical Addition**
  - Type: Alum and/or polymer
  - Capacity: 0 to 50 mg/L

- **Rapid Mixer**
  - Type: Static
  - Energy gradient: 650 l/sec
  - Detention time: 30 seconds

It may not be necessary to operate these chemical feed facilities to achieve plant effluent water quality goals.
4.5.3.2 Dissolved Air Flotation

In this process, compressed air is added to the influent water in a pressurized pipe. The water then flows into an open circular tank, where the pressure immediately drops to atmospheric pressure. This causes the air in the water to form bubbles, which rise to the water surface. The movement of the air bubbles causes oils, grease, and floatable solids to rise to the water surface, where they can be skimmed. Heavier solids settle to the bottom of the tank. This process provides high removal of floatable solids, oils, and greases.

The sizing criteria for the air flotation process is as follows:

- **Dissolved Air Flotation**
  - Type: Circular tank
  - Tank overflow rate: 1.0 gpm/ft²
  - Recycle flow: 5 to 15 percent of feed flow
  - Feed water minimum temperature: 50°F
  - Air/solids ratio: 0.06

4.5.3.3 Microfiltration

Zenon ZeeWeed microfiltration treatment units will be installed to provide a very high-quality finished water. This ZeeWeed system consists of a rack of microfiltration elements mounted in a contact tank. Suction is applied to the filtrate connections on the ZeeWeed elements, which causes water to pass through the membranes. A continuous air-scour is provided by air diffusers mounted beneath the ZeeWeed elements. The air scour minimizes the buildup of debris and coatings on the membranes. Periodically, the membranes must be removed and chemically cleaned. This treatment unit does not function well with water containing oils and greases. That is the reason for providing dissolved air flotation treatment prior to the water entering the unit. Microfiltration is also an excellent pretreatment process for reverse osmosis treatment that may be added in the future. The sizing criteria for this equipment is as shown below.

- **Microfiltration**
  - Type: Vertical hollow fiber
  - Flux rate: 25 gal/ft²/day
  - Influent turbidity: Up to 100 ntu
  - Effluent turbidity: <2 ntu
  - Backwash frequency: 4 to 6 times/hour
  - Backwash duration: 45 seconds
  - Backwash volume: 347 gpm
4.5.3.4 Physical Treatment Equipment Summary

The equipment that will be provided is as follows:

- **Dissolved Air Flotation Feed Pumps**
  - Quantity: 2
  - Type: Submersibles
  - Capacity (each): 525 gpm @ 265 feet TDH
  - Horsepower (each): 10 hp
  - Control: Variable speed

- **Chemical Addition**
  - Quantity: 2 (1 alum, 1 polymer)
  - Type: Metering pumps
  - Capacity (each): 0 to 25 gph
  - Horsepower (each): 0.5 hp
  - Control: Flow paced by DAF feed pumps

- **Rapid Mixing**
  - Quantity: 1
  - Type: Static

- **Dissolved Air Flotation System**
  - Quantity: 1
  - Type: Circular
  - Capacity: 525 gpm
  - Diameter: 15 feet
  - Side water depth: 15 feet
  - Clarifier drive motor: 0.75 hp
  - Scoop drive motor: 0.75 hp
  - Air compressor: 5 hp
  - Pressure pump: 10 hp

- **Microfiltration Train**
  - Quantity: 1
  - Type: Zenon ZeeWeed
  - Dimensions: 40’L x 8’W x 8’D
• Microfiltration Blowers
  - Quantity: 2
  - Type: Positive displacement
  - Capacity (each): 640 scfm @ 5.2 psig
  - Horsepower (each): 5 hp
  - Control: Constant speed

• Microfiltration Filtrate Extraction Pump
  - Quantity: 2
  - Type: Centrifugal
  - Capacity (each): 525 gpm @ 23 feet TDH
  - Horsepower: 15 hp
  - Control: Constant speed

4.5.4 Ultraviolet (UV) Disinfection and Postchlorination

UV disinfection has been selected for this project. In this process, UV radiation is used to inactivate both pathogenic and nonpathogenic organisms. The filtered water effluent enters a series of UV reactors where it is passed along the surfaces of numerous UV-emitting lamps. Such a disinfection system does not require bulk chemical storage (such as chlorine compounds) on-site, although a small chemical cleaning system (acid) is required for UV lamp cleaning (to remove calcium/magnesium carbonate scale).

Using a UV disinfection system does not result in imparting a disinfectant residual in the finished water. Therefore, the nonpotable water distribution system/use area piping may have bacterial regrowth problems. Therefore, chlorination treatment will be installed and operated when needed to prevent biological growth problems in the distribution system.

Three UV disinfection systems have been approved by the state of California to meet Title 22 nonpotable water disinfection requirements:

- Low-pressure, horizontal lamp systems
- Low-pressure, vertical lamp systems
- Medium-pressure, high-intensity lamp systems

The low-pressure, horizontal lamp system was selected for this project. In horizontal lamp systems, the lamps are positioned horizontally and parallel to the direction of water flow. The lamps are stacked vertically with 3 inches of separation between lamps. Each vertical group of lamps is called a module. The number of lamps needed in each module depends on the depth of the channel and ranges from 2 to 16. The lamp modules are set side by side across the channel, with 3 inches of separation (center to center) between lamps in adjoining modules. The set of modules spanning the channel comprises a lamp bank. Lamps are typically 64 inches long, which establishes the length of each bank.
The sizing criteria used is as follows:

- **UV Disinfection System**
  - Type: Low-pressure, horizontal bulb
  - UV transmittance, minimum: 55%
  - UV lamp output: 70% of nominal
  - Transmittance through sleeve including fouling: 70%
  - Minimum number of UV banks: 4
  - UV dose
    - At peak flow (minimum): 100 mWs/cm²
    - At average flow (minimum): 140 mWs/cm²

The equipment that will be provided is as follows:

- **UV Disinfection System**
  - Bulb type: Low pressure, horizontal bulb
  - Number of channels: 1
  - Number of banks: 5
  - Standby banks: 1
  - Total lamps: 220
  - Theoretical mean residence time: 49.1 seconds
  - Lamp arc length: 58 inches
  - UV intensity probes: Integral to system
  - Approach channel length: 4 feet minimum
  - Downstream channel length: 4 feet minimum
  - Channel width: 33 inches
  - Average channel water depth: 12 inches

The UV treatment equipment will be operated to achieve a 7-day median total coliform bacteria level of 2.2 MPN/100 mL.

Sodium hypochlorite feeding facilities will also be added for purposes of imparting a chlorine residual into the treated UV-disinfected water after it leaves the treated water storage reservoir. This chlorine will be added whenever necessary at the discharge of the treated water pumping station. This postchlorination treatment process will be operated if and when needed to maintain adequate bacteriological water quality in the distribution system.

The equipment that will be provided is as follows:

- **Chlorination system**
  - Chemical feed pump: 12 gal/hour
  - Day tank: 100 gallons
  - Feed control: Volumetric Effluent flow meter
4.5.5 Treated Water Storage Facility

The fully treated, UV disinfected water is discharged into a finished water storage reservoir. This reservoir is 45’L x 35’W with a side water depth of 20 feet. It has a storage capacity of 200,000 gallons. It has an airgapped potable water makeup line that is 6 inches in diameter. The inlet pipe terminates at an elevation of 39.0 feet, and the internal overflow elevation is at 38.0 feet. The airgap is therefore 12 inches (twice the pipe diameter).

4.5.6 Treated Water Pumping Facilities

The finished water pumping facilities are designed for three 50-hp pumps and one 3-hp jockey pump. Initially, only two of the 50-hp pumps will be installed in addition to the jockey pump. The pump characteristics are shown below.

<table>
<thead>
<tr>
<th>Pump No.</th>
<th>hp</th>
<th>Delivery (gpm)</th>
<th>Type</th>
<th>Inlet (inches)</th>
<th>Outlet (inches)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3</td>
<td>20 @ TDH = 230'</td>
<td>Constant speed</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
<td>Min. 150 @ TDH = 208'</td>
<td>Variable speed</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
<td>Normal 350 @ TDH = 220'</td>
<td>Variable speed</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>4</td>
<td>Future</td>
<td>Max. 550 @ TDH = 230'</td>
<td>Variable speed</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

1Has a bypass back to reservoir through a PRV if there is no demand.

4.5.7 Raw and Treated Water Quality Monitoring

The raw and treated water quality could tentatively be monitored as shown on Table 4-2. Specific sampling point locations also need to be identified.

4.5.8 Potable Water Service to DWRRF

A 6-inch potable waterline enters the plant to discharge makeup/dilution water into the 200,000-gallon treated water forebay reservoir. This discharge into the forebay is made through an airgap separation. The only other potable water use inside the reclamation plant is for an emergency eyewash/shower. The 6-inch service line is metered. Installed immediately downstream of the meter is a 6-inch approved RPP backflow prevention device.

4.5.9 Landscape Irrigation With Nonpotable Water

The small amount of on-site landscaping will be irrigated with nonpotable water. The connection to nonpotable water will be made to the effluent piping of the treated nonpotable water pumping station that supplies the nonpotable water distribution system.
### Table 4-2
**Recommended Water Quality Monitoring Plan**  
Dry Weather Runoff Reclamation Facility  
City of Santa Monica

<table>
<thead>
<tr>
<th>Water Quality Constituents</th>
<th>Raw Water After Preliminary Treatment¹</th>
<th>Fully Treated Water After UV Disinfection</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Physical Analyses</td>
<td>Monthly</td>
<td></td>
</tr>
<tr>
<td>General Mineral Analyses</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Inorganic Chemical Analyses</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 502.2</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 507</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 508</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 515.2</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 525.1</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Organics - EPA Method 531.1</td>
<td>Yearly</td>
<td></td>
</tr>
<tr>
<td>Turbidity²</td>
<td>Continuously</td>
<td></td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>Continuously</td>
<td></td>
</tr>
<tr>
<td>Total Coliform</td>
<td>Daily</td>
<td></td>
</tr>
<tr>
<td>Boron</td>
<td>Quarterly</td>
<td></td>
</tr>
<tr>
<td>Oil and Grease</td>
<td>Monthly</td>
<td></td>
</tr>
<tr>
<td>Total Suspended Solids</td>
<td>Weekly</td>
<td></td>
</tr>
</tbody>
</table>

¹After screening and grit removal  
²It is planned to provide a permanent 24-hour composite sampling apparatus (Sigma) at the DWRTF for the treated water.
All of the on-site irrigation water piping system will be constructed using purple PVC piping manufactured for this purpose. The sprinkler heads will also be identified with purple components. The irrigation piping system will not serve any hose bibs. The use of hoses for washdown and maintenance purposes will only be operable with quick-disconnect couplers.

An identical landscape irrigation system using nonpotable water will be designed for the adjacently located Moss Avenue Pump Station site.
Section 5
Nonpotable Water Distribution System

5.1 General

The nonpotable water distribution system and the individual connections it will initially serve are shown on Figure 5-1. The majority of the distribution system mains vary from 4 to 12 inches in diameter, with short lengths of smaller diameter piping. The initial phase of the distribution system consists of the following piping:

<table>
<thead>
<tr>
<th>Footage (ft)</th>
<th>Diameter (inches)</th>
<th>Type of Piping</th>
</tr>
</thead>
<tbody>
<tr>
<td>623</td>
<td>12</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>7,117</td>
<td>10</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>3,222¹</td>
<td>8¹</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>882</td>
<td>6</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>465</td>
<td>4</td>
<td>Ductile iron</td>
</tr>
<tr>
<td>75</td>
<td>2</td>
<td>Soft copper</td>
</tr>
<tr>
<td>695</td>
<td>1.5</td>
<td>Soft copper</td>
</tr>
<tr>
<td>45</td>
<td>0.75</td>
<td>Soft copper</td>
</tr>
</tbody>
</table>

¹Additional 8-inch piping is planned but not yet designed from Ocean Avenue to Main Street along the Santa Monica Freeway across Rand Corp. (see dashed line on Figure 5-1).

Additional piping may be constructed in the future to supply additional use areas.

The top of the installed pipeline segments will be equipped with purple plastic warning tape embossed with the words, “Caution – Reclaimed Water – Do Not Drink.” This tape will be 3 inches wide and will be fastened to the pipe every 10 feet.

The piping system will include the following valve appurtenances:

<table>
<thead>
<tr>
<th>Appurtenance</th>
<th>No. Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air release assemblies</td>
<td>13</td>
</tr>
<tr>
<td>10” gate valves</td>
<td>3</td>
</tr>
<tr>
<td>8” gate valves¹</td>
<td>4</td>
</tr>
<tr>
<td>6” gate valves</td>
<td>2</td>
</tr>
<tr>
<td>4” gate valves</td>
<td>4</td>
</tr>
<tr>
<td>Fire hydrant assembly</td>
<td>6</td>
</tr>
</tbody>
</table>

¹Does not include the 8-inch line not yet designed to serve City Hall.
The valve boxes will have a special triangular heavy-duty cover. The top of the valves will be painted purple. The piping from the water supply main to each valve and hydrant will be spiral wrapped with purple warning tape. The fire hydrants will be painted purple. The air release valves will be painted purple.

5.2 Description of Nonpotable Water Distribution System

Shown on Figure 5-1 is a dashed line off the 12-inch line in Ocean Avenue. This is an 8-inch line not yet designed to extend nonpotable water service to Main Street and the Civic Center complex in the next phase of this project. Initially, only the City Hall area will be served. The 8-inch line will need to cross private property to go from Ocean Avenue to Main Street. Negotiations for obtaining a pipeline easement have not yet been completed. How the connection into the City Hall area is now configured and how it will be retrofitted is shown schematically on Figure 5-2.

5.2.1 Segment from Dry-Weather Runoff Reclamation Facility to Ocean Avenue and then to Colorado Avenue

Within this 632-foot-long reach, the pipeline is 12 inches in diameter. The pipe crosses over three 8-inch sewer lines and over one inactive 16-inch sewer line. The vertical separation distances are all greater than 12 inches. The line parallels an 8-inch sewer line at a separation distance of greater than 10 feet. There is one air release valve and no fire hydrants off the 12-inch line within this reach.

5.2.2 Segment from Ocean Avenue and Colorado Avenue to Palisades Park at Arizona (Palisades Park Lateral)

Within this 2,151-foot-long reach, the pipe is 8 inches in diameter. The pipe crosses no sewer lines, and there are no parallel sewer lines within 10 feet of the lines. There are no air release valves or fire hydrants off the line within this reach. At the end of the line there is a 4-inch irrigation water outlet into Palisades Park. The current hookup and planned retrofit are shown on Figure 5-2.

5.2.3 Segment from Ocean Avenue and Colorado Avenue to Colorado Avenue and Palm Court

Within this 1,614-foot-long reach, the pipe is 10 inches in diameter. The pipe crosses over an inactive 18-inch sewer, a 30-inch sewer, an 8-inch sewer, and a 6-inch sewer within this region of the pipe. The vertical separation distances are all greater than 12 inches. Within this reach the pipe parallels an 18-inch sewer at a horizontal separation distance of greater than 10 feet. There are two air release valves along this reach of the pipe and no hydrants. There are no connections off this segment.

5.2.4 Palm Court Lateral

This 4-inch, 694-foot-long lateral serves one of the three Caltrans irrigation water services. There are no sewer crossings within this segment. A 6-inch sewer line parallels the 4-inch nonpotable waterline at a
PALISADES PARK CONNECTION AT ARIZONA

NOW

- POTABLE WATER SOURCE
  - METER
  - RPP BACKFLOW PREVENTER (REMOVE)
  - IRRIGATION

RETROFITTED

- POTABLE WATER SOURCE
  - RECYCLED WATER SOURCE
  - SAME METER (RPP REMOVED)
  - IRRIGATION

CITY HALL CONNECTION

NOW

- POTABLE WATER SOURCE
  - METER
  - PARCEL 18 PVB BACKFLOW PREVENTER
  - DOMESTIC
  - IRRIGATION

RETROFITTED

- POTABLE WATER SOURCE
  - RECYCLED WATER SOURCE
  - SAME METER
    - INSTALL NEW RPP BACKFLOW PREVENTER (REMOVED)
  - DOMESTIC
  - IRRIGATION

CITY OF SANTA MONICA
PALISADES PARK /
CITY HALL CONNECTIONS

BOYLE ENGINEERING CORPORATION

FIGURE 5-2
separation distance of 6 feet. There is one air release valve off the line and no hydrants. The current and retrofitted connections are shown on Figure 5-3.

5.2.5 Segment from Colorado Avenue and Palm Court to Colorado Avenue and 11th Street

This 10-inch, 2,240-foot-long pipeline crosses over two 12-inch sewers, an 18-inch sewer, and a fourth sewer of unknown diameter. The vertical separation distances are all greater than 12 inches. For a distance of approximately 1,305 feet, the nonpotable waterline parallels a 12-inch sewer at a horizontal separation distance of approximately 4 feet. This sewer line is about 7 feet deeper than the nonpotable waterlines. Along this stretch, there are two air vacuum release valves and one hydrant connection. Along this segment there are no irrigation water connections.

5.2.6 Segment from Colorado Avenue and 11th Street to 11th Street and Olympic

This is a 10-inch, 840-foot-long segment with one 12-inch sewer crossing. The top of this sewer is about 12 inches below the invert of the waterline. A 12-inch sewer parallels the nonpotable waterline with a horizontal separation distance of 4 feet for a length of about 75 feet. This 12-inch sewer is 7 feet below the invert of the nonpotable waterline. There is one air release valve off the waterline within this segment and no hydrants. There are no irrigation water connections off this line segment.

5.2.7 Segment from 11th Street and Olympic to 17th Street and Olympic

This segment has 2,500 feet of 10-inch line, 100 feet of 8-inch line, and 180 feet of 4-inch line. The 10-inch nonpotable waterline crosses over and under sanitary sewers as shown below:

<table>
<thead>
<tr>
<th>Crosses</th>
<th>Over Sewer</th>
<th>Under Sewer</th>
<th>At</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10&quot;</td>
<td>10&quot;*</td>
<td>Olympic and 11th</td>
</tr>
<tr>
<td></td>
<td>8&quot;</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>8&quot;*</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>8&quot;&quot; and 8&quot;</td>
<td>--</td>
<td>Alley west of 14th</td>
</tr>
<tr>
<td></td>
<td>8&quot;&quot;* and 8&quot;</td>
<td>--</td>
<td>Alley east of 14th</td>
</tr>
<tr>
<td></td>
<td>8&quot;</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>8&quot; and 8&quot;*</td>
<td>--</td>
<td>--</td>
</tr>
</tbody>
</table>

1 Abandoned sewers.
2 This is not believed to be significant because of the watertight joints in the new nonpotable water pipelines proposed that cross under sewers.

There are no sewer crossings involving the 100 feet of 8-inch pipeline or the 180 feet of 4-inch pipeline. A 10-inch sewer parallels the 10-inch nonpotable water line at a horizontal distance of 15 feet.
CAL TRANS CONNECTION OFF PALM COURT, 11TH STREET AND 17TH STREET

NOW

POTABLE WATER SOURCE

METER

RPP BACKFLOW PREVENTER (REMOVE!)

IRRIGATION

RETROFITTED

POTABLE WATER SOURCE

RECYCLED WATER SOURCE

SAME METER (RPP REMOVED)

IRRIGATION

SIX (6) OLYMPIC MEDIAN CONNECTIONS

NOW

METER

RPP BACKFLOW PREVENTER (REMOVE!)

IRRIGATION

RETROFITTED

SAME METER (RPP REMOVED)

IRRIGATION

CITY OF SANTA MONICA

CAL TRANS/OLYMPIC MEDIAN CONNECTIONS

BOYLE ENGINEERING CORPORATION

FIGURE 5-3
throughout its enter length. The 10-inch/8-inch line segment has three air release valves and three hydrant appurtenances. This line segment serves the following irrigation water connections:

- Six connections to Olympic Boulevard medians
- One connection to Caltrans (11th Street, 4-inch lateral)
- Two connections to Memorial Park

The connections to Caltrans and the six connections serving the Olympic Boulevard medians are shown on Figure 5-3. The two irrigation connections into Memorial Park are shown on Figure 5-4.

5.2.8 Segment from 17th Street and Olympic to 17th Street and Delaware

This segment has 1,120 feet of 8-inch piping. There are no sewer crossings within this segment. No sewers parallel the line within a horizontal separation distance of 10 feet. Within this segment there is one air release valve and one hydrant assembly. This segment serves one irrigation service to Caltrans.

5.2.9 Segment from 17th Street and Delaware Avenue to 15th Court and Delaware

This 555-foot-long, 6-inch pipe segment has one 8-inch sewer line crossing. At this location, the sewer crosses over the nonpotable waterline. There are no sewer lines in parallel construction. Along the line there is one air release valve assembly and one hydrant connection. At the end of the line there is one irrigation water connection into Woodlawn Cemetery. This connection (Meter 2) is shown on Figure 5-5.

5.2.10 Segment in 15th Court West of Delaware

This 182-foot-long segment is 6 inches in diameter. It has one 8-inch sewer crossing where the sewer is over the nonpotable waterline. The line also parallels an 8-inch sewer at a horizontal separation distance of approximately 7 to 8 feet. There are no air release or hydrant assemblies along this segment. At the end of the line is an irrigation water service to the Woodlawn Cemetery. This connection is shown on Figure 5-5 as Meter 3.

5.3 Water Quality Monitoring in Nonpotable Water Distribution System

Initially, the type of disinfection to be provided is UV disinfection. This type of disinfection results in no disinfectant residual in the treated water. The treated nonpotable water may therefore generate bacteria/slime growths inside the delivery pipelines and on-site irrigation piping systems. This may occur because the water may contain nutrients and the water usage will be nonuniform, being based on climate. Bacteria growths can cause sliming problems resulting in water that has color and contains visible particles. Such water may also cause "septic odor" problems when the water is sprayed through "fine spray" sprinkler heads.
MEMORIAL PARK METERS 1 AND 2

NOW

DOMESTIC

IRRIGATION

METER 1

RPP BACKFLOW PREVENTER

POTABLE WATER SOURCE

RETROFITTED

DOMESTIC

IRRIGATION

METER 1

SAME

RPP BACKFLOW PREVENTER

METER 2

RECYCLED WATER SOURCE

POTABLE WATER SOURCE

MEMORIAL PARK METER 3

NOW

DOMESTIC

IRRIGATION

IN-LINE BOOSTER PUMP

RPP BACKFLOW PREVENTER

METER 3

POTABLE WATER SOURCE

RETROFITTED

DOMESTIC

IRRIGATION

IN-LINE BOOSTER PUMP

RELOCATED

RPP BACKFLOW PREVENTER

SAME METER

NEW METER

RECYCLED WATER SOURCE

POTABLE WATER SOURCE

CITY OF SANTA MONICA
MEMORIAL PARK CONNECTIONS

BOYLE ENGINEERING CORPORATION

FIGURE 5-4
WOODLAWN CEMETERY METER 2

**NOW**

- HOSE BIBS FOR FLOWER WATERING
  - DOMESTIC
  - METER 4
  - METER 5
  - POTABLE WATER SOURCE
  - RPP BACKFLOW PREVENTER
  - METER 2

**RETROFITTED**

- HOSE BIBS FOR FLOWER WATERING
  - DOMESTIC
  - NEW RPP BACKFLOW PREVENTER
  - METER 4
  - METER 5
  - POTABLE WATER SOURCE
  - RRP BACKFLOW PREVENTER
  - METER 2 (SAME)
  - RECYCLED WATER SOURCE

* ● = PRESSURE VACUUM BREAKER

WOODLAWN CEMETERY METER 3

**NOW**

- IRRIGATION
  - RPP BACKFLOW PREVENTER (REMOVE)
  - METER 3
  - POTABLE WATER SOURCE

**RETROFITTED**

- IRRIGATION
  - SAME METER 3
  - POTABLE WATER SOURCE
  - RECYCLED WATER SOURCE

CITY OF SANTA MONICA
WOODLAWN CEMETERY
CONNECTIONS

BOYLE ENGINEERING CORPORATION

FIGURE 5-5
It is therefore recommended that each nonpotable water use area be sampled for the water quality parameters as follows:

<table>
<thead>
<tr>
<th>Constituent</th>
<th>Sampling Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total/Fecal Coliform Bacteria</td>
<td>Monthly</td>
</tr>
<tr>
<td>HPC Bacteria</td>
<td>Monthly</td>
</tr>
<tr>
<td>Color</td>
<td>Monthly</td>
</tr>
<tr>
<td>Odor</td>
<td>Monthly</td>
</tr>
<tr>
<td>Electrical Conductivity</td>
<td>Monthly</td>
</tr>
<tr>
<td>Chlorine Residual*</td>
<td>Monthly</td>
</tr>
</tbody>
</table>

*If and when the City initiates chlorination at the DWRRF for quality control in the distribution system.

The purpose of including electrical conductivity to this list is for demonstration of Basin Plan compliance and to verify that blending (when necessary) at the DWRRF is effective.

With time, this generated water quality data will indicate the need (or lack thereof) at the DWRRF to operate the installed sodium hypochlorite treatment facilities for the prevention of bacteria growths and/or the prevention of odor problems by maintaining some minimum chlorine residual at all nonpotable water use areas.

The monthly samples at each use area will be collected from an internal hose bib controlled with a quick-disconnect coupler control system. One such site will be provided in each use area. This hose bib should be allowed to run for at least 5 minutes before the sample is collected.
Section 6
Nonpotable Water Use Areas

6.1 General

The following areas will be retrofitted for receiving nonpotable water:

- Palisades Park (first three-block segment)
- Memorial Park
- Woodlawn Cemetery
- City Hall/Civic Center (next project phase)
- Olympic Boulevard medians
- Santa Monica Freeway rights-of-way

All of these areas currently use the City’s potable water system for both domestic and landscape irrigation water uses. Each of the above areas will be described individually in this section of the report.

6.2 On-Site Reviews

Each targeted nonpotable water use area was visited. Testing was conducted at each site by turning off the water meters (domestic and irrigation) to determine which water meter supplied what internal water outlets and to determine if irrigation water meters also served internal domestic water outlets and if domestic water meters served internal irrigation water outlets. The work was done with the cooperation of City Water Department and Parks Department staff.

6.3 Palisades Park

6.3.1 Site Description

Palisades Park is a city park that extends from Colorado Avenue north to Adelaide Drive along the bluff of the Pacific Ocean in Santa Monica. Only the most southerly segment of this park is to be initially retrofitted for using nonpotable water for landscape irrigation. The initial segment of the park that was reviewed to be retrofitted lies between Colorado Avenue and California Avenue. This segment and the entire park area are shown on Figure 6-1. Development of the first park segment in terms of facilities is shown schematically on Figure 6-2.

The park portions located between California Avenue and Adelaide Drive will be retrofitted for nonpotable water at a later date, at which time a supplemental Engineering Report will be prepared by the City of Santa Monica and submitted to DHS for review and approval. A landscape architecture firm
is presently working on designing a new sprinkler irrigation system for that portion of the park, including provisions to improve the park itself. This firm has been informed that eventually all of Palisades Park is to be irrigated with nonpotable water. Their ongoing design of the new sprinkler system will take this into account. The total park area is about 1.5 miles long and about 100 feet wide, while the initial area to be retrofitted is about five city blocks long. Palisades Park has been in existence for many years. Irrigation is carried out between 0100 and 0600 hours. The irrigation is controlled by a central computer.

The initial park segment to be retrofitted has two water services:

- A 2-inch-diameter water service near Broadway that provides domestic water for:
  - Senior Recreation Center and public restrooms
  - Two drinking fountains near Colorado Boulevard
  - Drinking fountain at the shuffleboard court
  - Two drinking fountains near Santa Monica Boulevard
  - Drinking fountain at Arizona Avenue
  - Drinking fountain at groundskeeper’s shed near California Avenue

  This 2-inch domestic water service connection is currently not equipped with an approved backflow prevention device.

- A 4-inch irrigation water service near Arizona Avenue that provides landscape irrigation water for the five-block-long segment of the park between Colorado Boulevard and California Avenue and possibly areas north of the California Avenue incline.

The initial park area has no hose bibs, only quick-disconnect couplers for making hose connections used during park maintenance and washdown of sidewalk areas and the shuffleboard court area. The five drinking fountains were visually inspected and found not to be exposed to misting from nearby sprinklers unless heavy wind conditions set in. The only public restroom facilities are at the Senior Recreation Center. There are no fish cleaning facilities in this park segment.

### 6.3.2 Retrofit Modifications

The retrofits for this initial project will be as follows:

- The 2-inch domestic water service will be equipped with a 2-inch RPP backflow prevention device as close to the water meter as possible. This device will be installed above ground level.

- The 4-inch irrigation water connection will be disconnected from the potable water supply system at a location upstream from the 4-inch water meter and then reconnected to the new nonpotable water supply system. The existing 3-inch RPP backflow preventer will then become redundant and will therefore be physically removed (also see Figure 5-2).
• The area will be reviewed once more for outside hose bibs, especially around the Senior Recreation Center and the shuffleboard area. If any are found, they will be physically removed.

• All existing (and future) quick-disconnect couplers will be painted purple and marked with plastic purple warning tags stating that nonpotable water is being used for irrigation and to not drink the water.

• The new irrigation water meter box will be painted purple and a plastic purple-colored warning tag will be installed inside the meter box.

• All new irrigation piping to be installed above and below ground level will be constructed using ductile iron piping with attached purple warning tape.

• All on-site irrigation water controller boxes will be painted purple and equipped with a plastic purple warning tag.

• A durable metal warning sign will be constructed in the center of the park (one sign every 500 feet) informing the general public in English and Spanish, “Reclaimed Water Used for Irrigation – Do Not Drink.”

• All irrigation and domestic waterlines between the park segment receiving nonpotable water service and the park area north of this segment will be physically severed. This will be done by the contractor by digging a 4- to 5-foot-deep trench across the width of the park. By doing this, the contractor will locate all existing lines, then sever and cap them. This safeguard will prevent possible cross-connections affecting the park area north of California Avenue.

• After the retrofit is completed, a cross connection check will be made as follows:
  - The nonpotable water service will be closed and the domestic water service kept active. All sprinkler outlets will be opened. None should become active, but all domestic water outlets should remain active.
  - The nonpotable water service will then be opened and the domestic water service closed. All sprinkler outlets should then be active with all domestic water outlets being inactive.

This check should be supervised by City staff and their consultants for this project.

• An on-site water supervisor will be appointed. Only the supervisor will be able to approve future piping modifications. This supervisor will be a City employee that has been trained on this project and its public health safeguards.
6.4 Memorial Park

6.4.1 Description of Site

This City park has existed for many years. The site is bounded by Olympic Boulevard on the east, 16th Street on the north, 14th Street on the south, and Colorado Avenue on the west. The site is currently served by three water meters off the City’s potable water system. All are located on Olympic Boulevard. The amount of water used in the park for irrigation purposes is said to vary from 20,000 to 25,000 gpd.

Meter 1 is a 2-inch domestic water service meter. It serves the following water outlets within the park:

- Police Activity League building
- Gymnasium/senior gathering building and outside drinking fountains
- Shower facility for the homeless
- Outside drinking fountain in front of gymnasium
- Restrooms serving the gymnasium

This 2-inch service connection is currently not equipped with a backflow prevention device. An RPP backflow preventer will need to be installed.

There is a groundskeeper shed near the tennis court area. It has no domestic water service. Figure 6-3 is a sketch that shows the various developments within the park.

Meter 2 is a 2-inch irrigation water service connection within a few feet from Meter 1. This line serves various planters, lawn parkways (between streets, curbs, and sidewalks along Olympic and 14th Street), the tot lot, the tennis court area, the dog run area, and adjacent landscaping. This service is currently equipped with a 2-inch Febco RPP backflow prevention device (see Figure 5-4).

Meter 3 is a combination domestic water/irrigation water meter as shown on Figure 5-4. Currently, the incoming water is metered and then split. One side of the split is for the following domestic use purposes:

- Public restrooms in the center of the park (see Figure 6-3)
- Drinking fountain at the public restrooms

Snack shop at 16th Street The other side of the split supplies irrigation water. This water first flows through a 2-inch RPP backflow prevention device and then an inline booster station. This booster pump comes on when the water supply pressure is too low. The irrigation line supplies all of the playing fields, the parkway grassy areas along 16th Street, some of the parkway areas along Olympic Boulevard, the picnic area (except one quick-disconnect coupler), and grassy areas between the property lines along Olympic and 16th Street and sidewalks.

Most of the landscape irrigation is handled by a centrally controlled station. The park perimeter along 16th Street, Olympic Boulevard, and 14th Street has landscaped frontages and medians planted in grass, planters, and bushes. There may be quick-disconnect couplers on the premises, but none were noted.
None of the outside drinking fountains appear subject to nearby misting sprinklers. These fountains are at the adult gathering building, the gymnasium, and the central restrooms.

6.4.2 Hose Bibs

There are numerous hose bibs off the irrigation water piping system. The approximate locations of these hose bibs are shown on Figure 6-3. They must all be removed or replaced with quick-disconnect couplers that cannot be operated by the general public and tagged with a permanent plastic purple tag labeled “Reclaimed Water – Do Not Drink” in English and Spanish.

- Nine hose bibs are on the tennis courts. They are used for flushing and cleaning the tennis court areas and for drinking by the players.
- One hose bib is in the dog run area. This bib is used for watering dogs and possibly by dog owners and trainers.
- One hose bib is located 50 feet east of the central restrooms in a subsurface meter box.
- Two or three hose bibs are outside the fence of the tennis courts and parking lot facing 14th Street.

There also is a hose bib on the bottom of the drinking fountain by the central public restrooms. This faucet is at times used to mist groups of young children to cool them down on very hot days. This misting by their teachers was observed during the inspection of the facility.

6.4.3 Retrofit Modifications

The following retrofits will be made:

- Meter 1 will be equipped with an approved RPP backflow prevention device as shown on Figure 5-4.
- Meter 2 will be served from the potable water supply system and reconnected to the nonpotable water supply system as shown on Figure 5-4. The domestic water supply side of Meter 3 will be equipped with an approved RPP backflow prevention device as shown on Figure 5-4.
- The irrigation water side of Meter 3 will be disconnected from the potable water supply and then connected to the nonpotable water supply system as shown on Figure 5-4.
- The top of the Meter Box 2 and new Meter Box 3 will each be painted purple, and the inside of each box will be equipped with a plastic warning tag stating, “Caution: Reclaimed Water – Do Not Drink.”
- All new piping involved in reconstructing the modified irrigation water meters and services will be installed with purple warning tape.
• The top of all central and individual irrigation water controllers will be painted purple and a plastic warning tag will be installed in each subsurface control box.

• All hose bibs will be removed that now exist on the irrigation water piping system. That includes the hose bibs along the fence line on 14th Street and all hose bibs in the tennis court area (see Figure 6-3). They may be replaced with hose quick-disconnect couplers and purple plastic tags stating “Reclaimed Water – Do Not Drink” in English and Spanish.

• The hose bib in the dog run area will remain but will be posted with a durable, metal warning sign that states, “Caution – Reclaimed Water – Do Not Drink.” Both English and Spanish signs will be provided. The water should be acceptable for the watering of dogs.

• All existing aboveground PRV piping that carries irrigation water will be spiral wrapped with purple warning tape.

• Durable warning signs will be installed at each park entrance (parking lot, tot lot, snack shop, etc.). Additional warning signs should be installed as follows:
  - In each baseball/softball/soccer playing area
  - Inside tot lot
  - Inside picnic area

  Again, these signs will say in English and Spanish, “Caution: Reclaimed Water Used for Irrigation – Do Not Drink Except from Drinking Fountains.”

• A new drinking fountain should be installed at the entrance into the tennis court area by the maintenance shop. Its supply line should come from the same supply line to the gymnasium outside drinking fountain.

• After all of the retrofit work is completed, another cross-connection check should be conducted.
  - First all irrigation water meters (two and three) will be closed, but all domestic water will be kept active and all water outlets will be tested.
  - Then all domestic water meters will be closed with all irrigation water meters being opened. Again, all water outlets in the park will be tested.

  This work should be observed by City staff and its consultants for this project.

• An on-site water supervisor will be appointed for this site. Only the supervisor can approve any future piping modifications within Memorial Park. This supervisor will be a City employee that has been trained on this project and the required safeguards.
6.5 Woodlawn Cemetery

6.5.1 Description of Site

This cemetery has existed for many years. The overall site layout is shown on Figure 6-4. Irrigation is carried out during 0630 to 0800 hours and is controlled by automatic controllers. Current water users within the premises are as follows:

- Domestic water at the mausoleum
- Domestic water at the caretaker’s shop
- Irrigation water for the numerous grave parcels
- Water outlets for the watering of flowers at graves. There are numerous such outlets throughout the cemetery. All of these outlets are off the irrigation water piping system.

The cemetery has one domestic water piping system and two irrigation water piping systems—one east and one west of Delaware Avenue. Parcels 17, 18, and 19 (west of Delaware) are served by one irrigation water piping system. Parcels 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13-S½, 13-N½, 14, 15, and 16 (east of Delaware Avenue—see Figure 6-5) are served by the second irrigation water piping system.

The administrative offices are located in the mausoleum building. It contains two restrooms, one for the staff and one for cemetery visitors. Each restroom has a sink for hand washing. There are no drinking fountains inside or outside of this building. The maintenance shop building includes a toilet and a sink for hand washing. The building also has a showering facility and a small kitchen-type sink.

Figure 6-5 shows that several streets that criss-crossed the cemetery have been abandoned and filled in to make room for additional graves. Figure 6-5 shows the cemetery to be bordered by 17th Street, Pico Boulevard, 14th Street, Michigan Avenue, an alley, and Delaware Avenue. The perimeter of the cemetery is either fenced or walled. Figure 6-5 shows the presence of five individual water meters, only two of which will be retrofitted to convey nonpotable water.

**Meter 1** is located on 17th Street outside the walls of the cemetery. It is equipped with an RPP backflow prevention device and is used to supply irrigation water to cemetery property landscaping facing 17th Street. This outside irrigation piping system is new and is said not to be physically connected to the inside irrigation piping system serving Parcels 13-S½, 13-N½, 14, or 15. Water Meter 1 will continue to convey potable water and will at this time not be connected to the nonpotable water supply system.

**Meter 2** is located near the intersection of the alley and Delaware Avenue. It conveys water into the irrigation water piping system serving all of the irrigation parcels located east of Delaware Avenue. The outlet from this meter goes through an RPP backflow prevention device. Within Parcels 1 through 16, all of the flower watering faucets are off the irrigation water piping system. This meter will be retrofitted for nonpotable water.
CITY OF SANTA MONICA
SITE MAP
WOODLAWN CEMETERY

BOYLE ENGINEERING CORPORATION

FIGURE 6-4
Meter 3 is located at the alley. This meter supplies water through an RPP backflow prevention device into the irrigation water piping system serving Parcels 17 and 18. This meter will be retrofitted to supply nonpotable water to irrigate not only Parcel 18, but also Parcels 17 and 19.

Meter 4 is used to supply domestic water to the shop building on Delaware Avenue near 14th Street and irrigation water through a pressure vacuum breaker (PVB) backflow prevention device constructed above ground level near the shop. This PVB is installed in the wye after the meter. This meter will soon be modified to no longer supply irrigation water to Parcel 19. Instead of supplying irrigation water to Parcel 19, it will supply water to outlets used to water flowers in Parcels 17, 18, and 19 in addition to supplying domestic water for the shop building.

Meter 5 is used to supply domestic water to the mausoleum building. It currently has no backflow prevention device. This meter will continue to function as is.

6.5.2 Recent Internal Plumbing Modifications West of Delaware Avenue

The irrigation piping system serving Parcels 17, 18, and 19 has recently been replaced with a new piping system. This new piping system now interconnects all three piping systems into one system fed from Meter 3. A separate, smaller piping system was also built to serve only the flower watering outlets located in Parcels 17, 18, and 19. This system is now fed from Meter 4 through the one-time irrigation water connection off Meter 4.

Figure 6-6 schematically shows the following:

- What Meter 3 served before the new piping modification and what is serves now.
- What Meter 4 served before the new piping modification and what it serves now.

Figure 6-7 schematically shows how the current piping system will change by retrofitting to nonpotable water:

- Disconnect the potable water supply source and reconnect the service line to the nonpotable water supply line.
- Continue using Meter 3 but remove downstream RPP backflow prevention device.
- Replace the PVB with new approved RPP device on the service line to the new dedicated line supplying the flower watering outlets in Parcels 17, 18, and 19. This device will be installed where the PVB is now installed.
- It is recommended that all flower water outlets be equipped with a warning sign or plastic purple tag that states “Reclaimed Water - Do Not Drink” in English and Spanish. This will be consistent with reclaimed flow water outlets in the rest of the park.
6.5.4 Water Service East of Delaware Avenue Before and After Retrofit

Meter 2 now supplies all irrigation east of Delaware, including all outlets for flower watering purposes. The supply line into Meter 2 will be disconnected from the potable water supply line and reconnected to the nonpotable water supply line. The meter will continue to be used, the RPP backflow preventer will be removed as it will no longer be needed. The current configuration is shown schematically on Figure 6-8.

Meter 5 and its use will not change. How this meter is served now is shown schematically on Figure 6-8. Figure 6-8 shows the retrofit modifications that will need to be made, such as:

- At the alley and Delaware Avenue, the potable water supply source will be disconnected from Meter 2, and the nonpotable water supply source will be connected to Meter 2 (see Figure 5-5).

- Meter 2 will continue to be used, but the downstream 4-inch RPP backflow prevention device will be removed since it is no longer necessary (see Figure 5-5).

- The removed 4-inch approved RPP backflow prevention device will be installed on the 8-inch domestic water supply line that will continue to supply Meters 4 and 5. This much smaller device (than the 8-inch line) should suffice because of the very low domestic water demand through the 8-inch line to Meters 4 and 5.

- At Point A (Figure 6-8), the waterline routing into Palm Avenue (no longer used) will be located, severed, and capped.

- The existing irrigation water piping system will continue to supply not only the sprinklers, but also all of the outlets used to obtain water for flower maintenance.

- Each flower water outlet will be equipped with a warning sign or plastic purple tag that states "Reclaimed Water – Do Not Drink" in English and Spanish.

- Each outlet will be inspected monthly for purposes of warning sign maintenance/replacement due to ongoing vandalism problems. In time, a new separate piping system using potable water may also be installed east of Delaware as has already occurred for the areas west of Delaware Avenue.

- The pressure vacuum breaker at Meter 4 will be replaced with a new approved RPP backflow prevention device.

6.5.5 Other Retrofit Modification

The retrofit will include the following additional safeguards:

- Any outside hose bib off the irrigation piping system will be eliminated to stop the visiting public from drinking the water. Such hose bibs may exist behind the shop building and around the mausoleum building. The hose bibs may be replaced with quick-disconnect couplers.
• The use of hoses for maintenance purposes (hand watering, washdown and other outdoor maintenance activities) will be from quick-disconnect couplers.

• The following facilities will be painted purple and equipped with plastic purple warning tags:
  - The top of the Meter 3 vault cover with the tag inside the pit
  - The top of quick-disconnect couplers
  - The outside of irrigation water controllers

• Warning signs will be installed as follows:
  - Durable metal warning signs will be installed on posts at both entrances warning the public, "Reclaimed Water Used for Irrigation – Do Not Drink" in both English and Spanish.
  - Small, durable metal warning signs or plastic purple tags will be installed at all water outlets provided to obtain water for flowers. These signs will state, "Reclaimed Water – Do Not Drink" in both English and Spanish.
  - Warning signs will be installed on posts at representative locations throughout the cemetery using the same language as on the signs at each entrance.

• After all retrofit work is completed, both irrigation Meters 2 and 3 will be turned off with Meters 4 and 5 open. The following should then occur:
  - No sprinklers should be active.
  - No flower watering outlets should be active except in Parcels 17, 18, and 19.
  - Potable water should be active in the maintenance shop building and in the mausoleum.

• Then the RPP device near Meter 4 will be closed.
  - This should deactivate the flower watering outlets in Parcels 17, 18, and 19.
  - Keep all domestic water uses active inside the shop building.

• An on-site water supervisor will be appointed for this site. Only the supervisor can approve any future plumbing modifications within the cemetery. This supervisor will be a City employee that has been trained on this project and the required public health safeguards.

6.6 City Hall/Civic Center

This target use area will not be served or retrofitted until the next phase of this project. Figure 6-9 shows a schematic diagram of the Santa Monica City Hall and surrounding landscaped areas. Most of the landscaped areas shown are irrigated automatically. A few of the areas, designed with "BH" are watered "by hand" using hoses. The City Hall complex is currently served through a single 4-inch water meter on Main Street. This meter is currently supplied from the City’s potable water supply system. A waterline (most likely 4-inch) runs from the meter to a point near the building entrance where the line
splits into a domestic waterline supplying the inside of City Hall and a waterline that supplies the irrigation water piping system that fronts and surrounds the building. The branch-off supplying the irrigation water system is equipped with a pressure vacuum breaker backflow prevention device (Wilkins model 720A).

Most of the grounds around the building are irrigated automatically by a central control system around the midnight hour. Smaller landscaped areas are irrigated manually by hose as needed.

The estimated amount of water used daily for irrigation of the site is about 39,000 gpd. In the future, this project may be expanded to provide irrigation for additional areas near City Hall. Such a project expansion will not be done until a supplemental Engineering Report is prepared, submitted and reviewed by DHS.

When installed in the next phase of this project, the retrofit work to be provided will include the following:

- The existing water meter and on-site supply line from the meter to the building will be retained as is, but the irrigation branch-off will be severed as shown on Figures 6-10 and 5-2.

- The existing 4-inch supply line that will continue to be used for domestic water supply purposes will be equipped with an approved 4-inch RPP backflow prevention device. This device will be installed as close to the Main Street sidewalk as possible. This device will be installed above ground level.

- A new 4-inch nonpotable water supply line will be extended from Main Street to the severed water irrigation take-off as shown on Figure 6-10. The existing pressure vacuum breaker will become redundant and will therefore be removed from the reconnected irrigation water piping near City Hall. The new supply line, both above and below ground portions, will be constructed with purple PVC piping specially made for nonpotable water uses (also see Figure 5-2). The existing hose bib found in front of City Hall on the irrigation water piping system will be physically removed, as will any other outside hose bib off the irrigation piping system.

- Only quick-disconnect couplers will be used when hoses need to be used for hand watering, washdown, and other outdoor water use purposes.

- All quick-disconnect coupler areas will be identified by painting them purple and by installing a plastic purple warning tag.

- The top of the new nonpotable water meter box will be painted purple, and a plastic warning tag will be installed inside the meter box.

- Irrigation water controller boxes will be painted purple, and a plastic warning tag will be installed inside the box.
• The new nonpotable water supply line from the nonpotable water meter to the building will be installed at least 4 to 5 feet away from the existing domestic water supply line.

• Durable, metal nonpotable water warning signs will be installed at the three locations shown on Figure 6-9. Each sign will state, "Reclaimed Water Used for Irrigation – Do Not Drink", in English and Spanish.

• After the retrofit is completed, a cross-connection check will be made.
  - The nonpotable water meter will be shut off and the domestic water meter kept on. Then the irrigation system will be checked to see that they are all inactive and that all water uses inside the building remain inactive.
  - The nonpotable water meter will then be opened and the domestic water meter closed. Now all outside irrigation outlets should be active, and all internal water use outlets should be inactive.

  This check should be witnessed by City staff and their consultants for this project.

• An on-site water supervisor will be appointed. Only the supervisor will be able to approve future piping modifications. This supervisor will be a City employee that has been trained on this project and its public health safeguards.

6.7 Olympic Boulevard Medians

Olympic Boulevard median strip areas between 10th Street and 20th Street will be retrofitted for nonpotable water irrigation. These median strips are wide, covered with grass, and planted with large shade trees. During periods of nice weather, these medians are used for sunbathing, picnicking, and other outdoor recreational activities by the nearby residing general public.

The median strip areas are divided into four segments that are separated by street crossings, as shown in the following table.

<table>
<thead>
<tr>
<th>Segment No.</th>
<th>West Boundary</th>
<th>East Boundary</th>
<th>No. of Water Services</th>
<th>Service has Backflow Preventer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10th St.</td>
<td>11th St.</td>
<td>1</td>
<td>Has a meter and an RPP backflow prevention device.</td>
</tr>
<tr>
<td>2</td>
<td>11th St.</td>
<td>14th St.</td>
<td>2</td>
<td>Each has a meter and an RPP backflow prevention device.</td>
</tr>
<tr>
<td>3</td>
<td>14th St.</td>
<td>17th St.</td>
<td>2</td>
<td>Each has a meter and a backflow prevention device.</td>
</tr>
<tr>
<td>4</td>
<td>17th St.</td>
<td>20th St.</td>
<td>1</td>
<td>Has a meter and a backflow prevention device.</td>
</tr>
</tbody>
</table>
This table segments the medians to be irrigated by street crossings (also see Figure 6-11).

In summary, these are four separate center divider medians, two with one water service connection each and two with two water service connections from the City’s potable water supply system. In each case, the meter is installed upstream from the backflow prevention device. Most, if not all, of the water meters and the reduced-pressure principal backflow prevention devices are 2 inches in diameter. None of the median islands were observed to have hose bibs that could be used by the general public for drinking.

Median irrigation is controlled from on-site computerized irrigation control boxes. Irrigation time is between midnight and 4 a.m. When active, the sprinklers were not observed to overspray into adjacent traffic lanes. The average amount of water used for irrigating these four islands is about 20,000 gpd.

The retrofits for each median island will be as follows:

- The existing domestic water service lines to each island will be physically severed upstream of each water meter and backflow prevention device (see Figure 5-3).

- Each backflow prevention device becoming redundant will then be removed to also eliminate unnecessary pressure losses (see Figure 5-3).

- A nonpotable water service line will be connected into each of the irrigation water service connections with the continued use of the existing water meters (see Figure 5-3).

- No on-site hose bibs will be allowed. If water outlets other than sprinkler heads are needed, only quick-disconnect couplers will be allowed. The top of each irrigation meter box will be painted with a purple color, and a plastic purple warning tag will be installed inside each meter box. This warning tag will state that reclaimed water is being used on-site for irrigation and to not drink the water.

- All on-site irrigation water controller boxes will also be painted purple and equipped with a similar plastic warning tag.

- One durable metal warning sign will be installed on each of the four island medians, notifying the public that reclaimed water is being used for irrigation and to not drink the water.

- All new piping used to connect the nonpotable water sources into the existing on-site irrigation piping systems will be constructed with purple-colored PVC piping manufactured for use in nonpotable water systems.

After the retrofit work is completed, all nonpotable water meters will be turned on to determine which sprinklers are served by each meter. After that is determined, each meter will be turned off, one at a time, to confirm that the related sprinklers also turn off. This check will confirm that no interconnections exist between the four median islands and the island east of 20th Street. This check should be witnessed by City staff and their consultants for this project.
6.8 Santa Monica Freeway – Caltrans Right-of-Way

This use area consists of the landscaped right-of-way slopes along both the eastbound and westbound freeway lanes. The areas to be irrigated are located between 4th Street and 19th Street. The irrigated areas are currently being served by three metered connections off the City’s potable water supply system. These meters are located at 4th Street, 11th Street, and 17th Street. The potable water system meter at 4th Street is located at the intersection of 4th Street and the north freeway onramp. The other two meters are located in the sidewalks adjacent to the 11th Street and 17th Street bridges. See Figure 6-12.

The three meters only supply segmented sprinkler systems. Caltrans usually irrigates during nighttime hours to avoid high temperatures and heavy traffic loads. Each of the existing irrigation water services is now equipped with approved backflow prevention devices.

The site retrofits will be made as follows:

- The current potable water connection to each of the three meters will be disconnected at a location upstream of each water meter and upstream of each backflow prevention device (see Figure 5-3).
- Each backflow prevention device becoming redundant will then be removed to also eliminate unnecessary pressure losses (see Figure 5-3).
- A nonpotable water service line will then be connected into each of the three irrigation water service connections with the continued use of the three existing meters (see Figure 5-3) or the installation of three new meters.
- All on-site hose bibs will be physically removed. Only quick-disconnect couplers will be allowed on-site for the occasional use of hoses for on-site maintenance purposes.
- The top of each irrigation meter box will be painted purple, and a plastic purple warning tag will be installed inside each meter box stating that reclaimed water is being used on-site for irrigation and to not drink the water.
- All on-site irrigation water controller boxes will be painted purple and equipped with a similar plastic warning tag.
- One durable metal warning sign will be installed between bridges on each side of the freeway notifying the motoring public that reclaimed water is being used for irrigation and to not drink the water.
- All new piping used to connect the nonpotable water sources into the existing on-site irrigation piping systems will be constructed with purple PVC piping manufactured for use in nonpotable water systems.
After retrofit is complete, all nonpotable water meters will be turned on individually to identify which sprinkler segments are being served off each meter. This will include the potable water meters west of 4th Street and east of 19th Street. After that is determined, all meters will be turned off, one at a time, to confirm that the related sprinklers also turn off. This check will confirm that no interconnections exist between the three irrigation systems using nonpotable water and the adjoining irrigation systems west of 4th Street and east of 19th Street that are still being supplied from potable water system meters. This check should be witnessed by City staff and their consultants for this project.

6.9 Final Retrofit Confirmation

In their letter of September, 8, 1999, DHS made the following recommendation:

*It is recommended that the City's representatives, trained in cross-connection control issues, inspect the construction sites during conversion of the existing irrigation system to a nonpotable distribution system. These inspections should focus on the avoidance and abatement of cross-connections between the new nonpotable irrigation system and the existing domestic water supply system. Upon construction completion, the City should verify that no cross-connections have occurred by conducting a shutdown and/or pressure test. The City should conduct follow-up inspections and shutdown tests with sufficient frequency to assure that cross-connections have not occurred since the time of the last test.*

This work should be done by persons that are knowledgeable about the retrofit design features and on-site conditions and are trained in cross-connection control methods and requirements.
Appendix

- 10/28/97 Boyle Letter No. 1 to DHS
- 11/3/97 Boyle Letter No. 2 to DHS confirming the discussions of a meeting at DHS on 10/28/97
- 11/19/97 DHS letter to City of Santa Monica in response to the 10/28/97 Boyle Letter No. 1 to DHS
- DHS September 1997 Guidelines for the Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water
- 8/22/97 RWQCB letter to City of Santa Monica
- 10/28/97 Boyle Letter No. 1 to RWQCB
- 11/3/97 Boyle Letter No. 2 to RWQCB confirming the discussion of a meeting at the RWQCB on 10/28/97
- 12/1/97 RWQCB letter to City of Santa Monica in response 10/28/97 Boyle Letter No. 1 to RWQCB
October 28, 1997

Mr. Gary Yamamoto, Regional Engineer
STATE OF CALIFORNIA
DEPARTMENT OF HEALTH SERVICES
Office of Drinking Water
1449 West Temple Street
Los Angeles, CA 90026

City of Santa Monica Dry Weather Runoff Reclamation Facility Distribution System
Title 22 Engineering Report Requirements

Boyle Engineering Corporation has been retained by the City of Santa Monica (through a subcontract arrangement with CH2M HILL) to design a stand-alone non-potable water distribution system to serve recycled water for landscape irrigation purposes. The source of the water supply for this distribution system will be from a stormwater treatment plant (currently being designed by CH2M HILL) located adjacent to the Santa Monica Pier. Waste streams from this plant will be returned to the nearby community sewer system. The processes to be provided at this 0.5 MGD treatment plant include primary, secondary, tertiary, and disinfection treatment.

The treated water will be conveyed into a 0.3 million gallon subsurface storage reservoir. The storage tank will have a potable water makeup connection into the reservoir through an approved air-gap separation. The purpose of this potable water makeup connection will be to assure a dependable water supply to the irrigation water users supplied from the stand-alone non-potable water distribution system. The non-potable irrigation water distribution system will consist of waterlines ranging from 4 to 10 inches in diameter and will ultimately serve the following use areas:

- Woodlawn Cemetery
- Memorial Park
- Palisades Park
- Santa Monica City College
- John Adams School
- Medians in Olympic Boulevard between 10th Street and 19 Street
- Several Caltrans right-of-way parcels flanking the Santa Monica Freeway between 4th Street and 19th Street

Most of these target non-potable water use areas currently use potable water from the City’s domestic water supply system for domestic and landscape irrigation purposes. Therefore, each of the use areas to be served will be retrofitted for the use of non-potable water for landscape irrigation purposes. These retrofit activities will include:
Mr. Gary Yamamoto

Page 2

- Pipe disconnections/reconnections
- Pipe identification at ground level
- Valve identification at ground level
- Elimination of hose bibbs
- Placement of appropriate backflow prevention devices
- Protection of drinking fountains from aerosol mists
- Other site-specific public health protection safeguards

Recycled water projects normally require the preparation of a Title 22 Engineering Report that addresses the water source (WWTP), the non-potable water delivery system (piping, pumping, storage facilities), each recycled water use area, and a contingency plan for the WWTP reliability and each of the recycled water use areas.

As you know, Title 22 regulations currently apply only to the re-use of sewage. Although, Title 22 regulations would not appear to apply to the re-use of treated stormwater, we never-the-less would like to solicit your opinion via this letter (and our October 28, 1997 meeting) on whether the above-described project warrants the preparation of a Title 22 Engineering Report. The report, if required, would describe the project, the safeguards to be implemented in the project design and in future O&M operations to safeguard the public health in general, and the city’s domestic water system from possible cross-connections. We also plan to concurrently solicit an opinion from the California Environmental Protection Agency’s Los Angeles Regional Water Quality Control Board on whether that agency will require the city of Santa Monica to apply for a reclamation permit.

A timely written reply to this letter would be appreciated.

Boyle Engineering Corporation

Harvey R. Gobas, PE
Principal Engineer

cc Fritz Redlin - Boyle Engineering Corporation
Tim Joyce - City of Santa Monica
Jag Salgaonkar - CH2M HILL

OC-C77-100-02
Mr. Gary Yamamoto, Regional Engineer  
STATE OF CALIFORNIA  
DEPARTMENT OF HEALTH SERVICES  
Office of Drinking Water  
1449 West Temple Street  
Los Angeles, CA 90026

November 3, 1997

City of Santa Monica Dry Weather Runoff Reclamation Facility Distribution System  
Meeting to Review Regulatory and/or Title 22 Engineering Report Requirements

Fritz Redlin and I would like to thank you for meeting with us earlier this week to discuss regulatory issues and concerns relating to the City of Santa Monica’s proposed Dry Weather Runoff Reclamation Distribution system project. We believe the following points summarize our October 28, 1997 discussion relating to this project:

- The State of California Department of Health Services (CDHS) does not currently have any guidelines or regulations which relate directly to the use of treated stormwater for landscaping irrigation purposes.

- The primary reason why the State has not adopted any guidelines or regulations for this type of project is because no projects of this nature have been previously proposed.

- Generally speaking, CDHS is concerned about the protection of public health when non-potable is used in areas frequented by the public.

- For the most part, the end-users on this project (two parks, two schools, freeway and road right-of-way and a cemetery) will be irrigating in areas used by the public.

- Although no guidelines and regulations exist for use of treated stormwater, public health concerns dictate that an engineering report be prepared to document the proposed usages and demonstrate what provisions are being made to prevent possible cross connections between on-site potable and non-potable water systems and possible cross-connections to the City of Santa Monica’s supply system.

It is our understanding that you will addressing your concerns and regulatory requirements in a letter to the City of Santa Monica’s Project Manager, Mr. Tim Joyce (with copies to Boyle and CH2M HILL’s Project Manager Jag Salgaonkar), within the next two weeks. We further
understand, that your letter will comment specifically on what action, if any, you would like the City of Santa Monica to take prior to your granting approval to this project.

Boyle Engineering Corporation

Harvey R. Gobas, PE
Principal Engineer

cc Tim Joyce - City of Santa Monica
Jag Salgaonkar - CH2M HILL
Fritz Redlin - Boyle Engineering Corporation
Bob Carley - Boyle Engineering Corporation
Bill Everest - Boyle Engineering Corporation
Theresa Hutchings - Boyle Engineering Corporation

OC-C77-100-02
November 19, 1997

Mr. Tim Joyce
City of Santa Monica
1334 Third Street, #202
Santa Monica, CA 90401

Dear Mr. Joyce:

DRY WEATHER RUNOFF RECLAMATION FACILITY DISTRIBUTION SYSTEM

This is in response to a letter dated October 28, 1997, from Harvey R. Gobas of Boyle Engineering Corporation, who has been retrained to design a stand-alone non-potable water distribution system to serve treated dry weather runoff for landscape irrigation. In the letter, Mr. Gobas indicates that irrigation with the non-potable water will occur at a cemetery, parks, a city college, an elementary school, median strips and Caltrans right-of-way parcels. Most of these areas presently use potable water from the City's domestic water system, so retrofitting of the use areas will need to be done.

We are concerned about cross-connections that exist now or may occur in the future between the non-potable water system and the domestic water system. We therefore request an engineering report that would describe the project (distribution system and all use areas), existing piping at all use areas, piping changes at use areas, specifications for piping and appurtenances, labeling and signage, types and locations of backflow protection devices, protection of drinking fountains, separation of domestic and non-potable water lines, pressure tests (initial and future), identification of user supervisors, and other items. Enclosed is a document, "Guidelines for the Preparation of an Engineering Report for the Production, Distribution and Use of Recycled Water," which can be used as a reference.
If you have any questions, please contact me at (213) 580-5748.

Sincerely,

Gary H. Yamamoto, P.E., Chief
South Coastal Region
Drinking Water Field Operations Branch

Enclosure

cc: Harvey Gobas – Boyle Engineering, Newport Beach
    Fritz Redlin – Boyle Engineering, Fresno
    Jag Salgaonkar – CH2M Hill
    Winnie Jesena – LARWQCB
    Bob Harvey – Water Production and Treatment Superintendent
    1228 South Bundy Drive
    Los Angeles, CA 90025
1.0 INTRODUCTION

The draft State of California Recycled Water Criteria require the submission of an engineering report to the California Regional Water Quality Control Board (RWQCB) and the Department of Health Services (DHS) before recycled water projects are implemented. The report shall be amended prior to any modification to the project and describe the manner by which the project will comply with the Recycled Water Criteria. The Recycled Water Criteria are contained in Sections 60301 through 60355, inclusive, of the California Code of Regulations, Title 22, and prescribe:

* Recycled water quality and wastewater treatment requirements for the various types of uses,

* Use area requirements pertaining to the actual location of use of the recycled water, and

* Reliability features required in the treatment facilities to ensure safe performance.

Section 60323 of the Recycled Water Criteria specifies that the report be prepared by a properly qualified engineer, registered in California and experienced in the field of wastewater treatment.

Recycled water projects vary in complexity. Therefore, reports will vary in content, and the detail presented will depend on the scope of the proposed project and the number and nature of the agencies involved in the production, distribution, and use of the recycled water. The report should contain sufficient information to assure the regulatory agencies that the degree of treatment and reliability is commensurate with the requirements for the proposed use, and that the distribution and use of the recycled water will not create a health hazard or nuisance.

The intent of these guidelines is to provide a framework to assist in developing a comprehensive report which addresses all necessary elements of a proposed or modified project. Such a report is
necessary to allow for the required regulatory review and approval of a recycled water project.

2.0 RECYCLED WATER

The following sections discuss the type of information that should be presented and described in the engineering report. Some sections are applicable only to certain types of uses.

2.1 PRODUCER

The producer is the public or private entity that will treat and/or distribute the recycled water used in the project. Where more than one agency is involved in the treatment or distribution of the recycled water, the responsibilities of each agency should be described.

2.2 Raw Wastewater

Describe the chemical quality, including ranges with median and 95th percentile values;

Describe the source of the wastewater to be used and the proportion and types of industrial waste, and

Describe any source control programs.

2.3 Treatment Processes

Provide a schematic of the treatment train;

Describe the treatment processes including loading rates and contact times;

All filtration design criteria should be provided (filtration and backwash rates, filter depth and media specifications, etc.). The expected turbidities of the filter influent (prior to the addition of chemicals) and the filter effluent should be stated, and

State the chemicals that will be used, the method of mixing, the degree of mixing, the point of application, and the dosages.

2.4 Plant Reliability Features

The plant reliability features proposed to comply with Sections 60333 - 60355 of the Recycled Water Criteria should be described in detail. The discussion of each reliability feature should state under what conditions it will be actuated. When alarms are used to indicate system failure, the report should state where the alarm will be received, how the location is manned, and who will be notified. The report should also state the hours that the plant will be manned.
2.5. Supplemental Water Supply

The report should describe all supplemental water supplies. The description should include:

* Purpose
* Source
* Quality
* Quantity available
* Cross Connection Control Measures

2.6. Monitoring and Reporting

The report should describe the planned monitoring and reporting program, including all monitoring required by the Recycled Water Criteria, and include the frequency and location of sampling. Where continuous analysis and recording equipment is used, the method and frequency of calibration should be stated. All analyses shall be performed by a laboratory approved by the State Department of Health Services.

2.7. Contingency Plan

Section 60323 (c) of the Recycled Water Criteria requires that the engineering report contain a contingency plan designed to prevent inadequately treated wastewater from being delivered to the user. The contingency plan should include:

* A list of conditions which would require an immediate diversion to take place;
* A description of the diversion procedures;
* A description of the diversion area including capacity, holding time and return capabilities;
* A description of plans for activation of supplemental supplies (if applicable);
* A plan for the disposal or treatment of any inadequately treated effluent, and
* A plan (including methods) for notifying the recycled water user, the regional board, the state and local health departments, and other agencies as appropriate of any treatment failures that could result in the delivery of inadequately treated recycled water to the use area.
3.0 TRANSMISSION AND DISTRIBUTION SYSTEMS

Maps and/or plans showing the location of the transmission facilities and the distribution system layout should be provided. The plans should include the location of all potable water, recycled water and sewer lines within the use area. The report should take cognizance of the following documents:

* Guidelines for the Distribution of Non-potable Water, (California-Nevada Section-AWWA)

* California Waterworks Standards (1997)

* Regulations Relating to Cross-Connections (Title 17, Chapter 5, Group 4)

* Manual of Cross-Connection Control/Procedures and Practices (DOHS)

* Disinfected Tertiary Recycled Water Guidelines: On-Site Facility Retrofitting, (California-Nevada Section-AWWA)

4.0 USE AREAS

The description of each use area should include:

* The type of land uses;

* The specific type of reuse proposed;

* The party responsible for the distribution and use of the recycled water at the site;

* Identification of other governmental entities which may have regulatory jurisdiction over the re-use site such as USDA, State Food and Drug, State Licensing and Certification, etc. These agencies should also be provided with a copy of the Title 22 Engineering Report for review and comment.

* Use area containment measures;

* A map showing:

  - Specific areas of use
  - Areas of public access
  - Surrounding land uses
  - The location and construction details of wells in or near the use area
  - Location and type of signage
* The degree of potential access by employees or the public;
* For use areas where both potable and recycled water lines exist, a description of the cross-connection control procedures which will be used.

In addition to the general information described above, the following should be provided for the following specific proposed uses:

4.1 Irrigation

- Description of what will be irrigated (e.g. landscape, specific food crop, etc.);
- Method of irrigation (e.g. spray, flood, or drip);
- The location of domestic water supply facilities in or adjacent to the use area;
- Site containment measures;
- The direction of drainage and a description of the area to which the drainage will flow;
- A map and/or description of how the setback distances of Section 60310 will be maintained;
- Protection measures of drinking water fountains and designated outdoor eating areas, if applicable;
- Location and wording of public warning signs, and
- The proposed irrigation schedule (if public access is included).

- Measures to be taken to exclude or minimize public contact.

4.2 Impoundments

- The type of use or activity to be allowed on the impoundment;
- Description of the degree of public access;
- The conditions under which the impoundment can be expected to overflow and the expected frequency, and
- The direction of drainage and a description of the area to which the drainage will flow.

4.3 Cooling
- Type of cooling system (e.g. cooling tower, spray, condenser, etc.);
- Type of biocide to be used, if applicable;
- Type of drift eliminator to be used, if applicable, and
- Potential for employee or public exposure, and mitigative measures to be employed.

4.4 Groundwater Recharge

An assessment of potential impacts the proposal will have on underlying groundwater aquifers. The appropriate information shall be determined on a case by case basis.

4.5 Dual Plumbed Use Areas

In accordance with Sections 60314 through 60316 of the Recycled Water Criteria.

4.6 Other Industrial Uses

The appropriate information shall be determined on a case by case basis.

4.7 Use Area Design

The report should discuss how the facilities will be designed to minimize the chance of recycled water leaving the designated use area. Any proposed deviation from the Recycled Water Criteria and necessity therefore, should be discussed in the report. Any domestic water distribution system shall be protected from the recycled water in accordance with the Regulations Relating to Cross-Connections and the California Waterworks Standards.

4.8 Use Area Inspections and Monitoring

Identify the locations at the use area where problems are most likely to occur (e.g. ponding, runoff, overspray) and propose a program of use area inspection and reporting.

4.9 Employee Training

The report should describe the training which use area employees will receive to ensure compliance with the Recycled Water Criteria, and identify the entity that will provide the training and its frequency. The report should also identify any written manuals of practice to be made available to employees.
4.10 Rules and Regulations

The procedures, restrictions, and other requirements that will be imposed by the distributor and/or user should be described. The requirements and restrictions should be codified into a set of rules and regulations. The rules and regulations should include measures to be used to protect the public health and prevent cross-connections. Describe in the report the feasibility of the adoption of enforceable regulations to cover all of the distribution systems and use areas, and identify the agency or agencies that would adopt them.
August 22, 1997

Mr. Tim Joyce
Civil Engineering Department
City of Santa Monica
1685 Main Street, Room 112
Santa Monica, CA 90401-3295

CITY OF SANTA MONICA - DRY WEATHER RUNOFF RECLAMATION FACILITY UNDER THE LOS ANGELES COUNTY MUNICIPAL STORM WATER/URBAN RUNOFF PERMIT (BOARD ORDER 96-054, NPDES No. CAS614001, CI 6948)

On June 25, 1997, Regional Board staff met with staff from the City of Santa Monica (the City), the California Department of Health Services, and representatives of CH2MILL to discuss the City's Dry Weather Runoff Reclamation Facility (DWRFF) proposal.

The City of Santa Monica has proposed to construct and operate the DWRFF to treat dry weather urban runoff from the Pico-Kenter storm drain for reclamation and reuse. Treatment will primarily consist of ultraviolet disinfection to destroy pathogenic organisms and filtration/dissolved air flotation to remove solids. Dry weather flows from the Pico-Kenter storm drain range from 100,000 to 650,000 gallons per day (gpd). The DWRFF will be located on a site at the Santa Monica Pier and will be designed to treat 500,000 gpd annual average daily flow. During storms or other high flow events, flows in excess of 500,000 gpd will bypass the DWRFF and be discharged through the Pico-Kenter drain outfall. Three end users of the treated water have been identified at this time. They are: (i) Caltrans for irrigation of I-10 freeway between Pacific Coast Highway and the 405 freeway; (ii) City of Santa Monica cemetery; and (iii) Palisades Park. Additional end-users are being sought.

The City is a Permittee to the Municipal Storm Water Permit for Los Angeles County (Board Order No. 96-054; NPDES No. CAS614001). The Storm Water Management Program requires the City to reduce pollutants in storm water discharges and urban runoff to "the maximum extent practicable [by use of measures] including management practices, control techniques and system, design and engineering methods...."

Regional Board staff has reviewed influent characterization data and effluent water quality criteria provided by the City (Santa Monica DWRFF - Draft Technical Memorandum No. 1, dated May 19, 1997) and other documentation. The following constitutes our determination of requirements for the DWRFF:

Recycled Paper  Our mission is to preserve and enhance the quality of California’s water resources and ensure their proper utilization and efficient use for the benefit of present and future generations.
1. Separate waste discharge requirements will not be required. The DWRRF will be considered as a treatment best management practice to reduce pollutants in dry-weather flows under Board Order No. 96-054.

2. Treated effluent from the DWRRF is required to meet total dissolved solids (TDS) limit of 1,000 mg/L to protect beneficial uses of the Santa Monica groundwater basin, and any other applicable Los Angeles Region Water Quality Control Plan (Basin Plan) standard.

3. California Title 22 standards for treated sewage, in the absence of reclamation criteria for treated dry weather runoff, will serve as criteria for the DWRRF. Biological oxidation will not be required because the influent BOD already meets reclamation criteria.

4. The City will develop a monitoring program to ensure that the DWRRF effluent meets water quality and reclamation criteria. The City will work with Regional Board and Los Angeles County Department of Public Works staff to integrate DWRRF monitoring reporting into the Annual Monitoring Report submittal under Board Order No. 96-054.

If you have any questions on this matter, please call Carlos Urrunaga at (213) 266-7598 or Winnie Jesena at (213) 266-7593.

DENNIS A. DICKERSON
Executive Officer

cc: Catherine Kuhlman, U.S. Environmental Protection Agency, Region 9
Marianne Yamaguchi, Santa Monica Bay Restoration Project
Gary Yamamoto, California Department of Health Services
Billi Romain, City of Santa Monica
Gary Hildebrand, Los Angeles County Department of Public Works
Jag Salgaonkar, CH2MHILL
Jennifer Cohen, CH2MHILL
Mark Gold, Heal the Bay
David Beckman, Natural Resources Defense Council
Terry Tamminen, Santa Monica BayKeeper
City of Santa Monica Dry Weather Runoff Reclamation Facility Distribution System
Reclamation Project Permitting Requirements

Boyle Engineering Corporation has been retained by the City of Santa Monica (through a
subconsultant arrangement with CH2M HILL) to design a stand-alone non-potable water
distribution system to serve recycled water for landscape irrigation purposes. The source of the
water supply for this distribution system will be from a stormwater treatment plant (currently
being designed by CH2M HILL) located adjacent to the Santa Monica Pier. Waste streams from
this plant will be returned to the nearby community sewer system. The processes to be provided
at this 0.5 MGD treatment plant include primary, secondary, tertiary, and disinfection treatment.

The treated water will be conveyed into a 0.3 million gallon subsurface storage reservoir. The
storage tank will have a potable water makeup connection into the reservoir through an approved
air-gap separation. The purpose of this potable water makeup connection will be to assure a
dependable water supply to the irrigation water users supplied from the stand-alone non-potable
water distribution system. The non-potable irrigation water distribution system will consist of
waterlines ranging from 4 to 10 inches in diameter and will ultimately serve the following use
areas:

- Woodlawn Cemetery
- Memorial Park
- Palisades Park
- Santa Monica City College
- John Adams School
- Medians in Olympic Boulevard between 10th Street and 19th Street
- Several Caltrans right-of-way parcels flanking the Santa Monica Freeway between 4th
  Street and 19th Street

Most of these target non-potable water use areas currently use potable water from the City’s
domestic water supply system for domestic and landscape irrigation purposes. Therefore, each of
the use areas to be served will be retrofitted for the use of non-potable water for landscape
irrigation purposes. These retrofit activities will include:
Mr. Dennis Dickerson

Page 2

Pipe disconnections/reconnections
Pipe identification at ground level
Valve identification at ground level
Elimination of hose bibbs
Placement of appropriate backflow prevention devices
Protection of drinking fountains from aerosol mists
Other site-specific public health protection safeguards

As you know, recycled water projects which use treated sewage for irrigation purposes normally require a reclamation permit from the Regional Water Quality Control Board. The purpose of this letter (and our October 28, 1997 meeting) is to solicit your input on the specific permitting requirements for this project. We also plan to concurrently solicit an opinion from the State of California Department of Health Services Office of Drinking Water on whether that agency will require the city of Santa Monica to prepare a Title 22 Engineering Report for this project.

A timely written reply to this letter would be appreciated.

Boyle Engineering Corporation

Harvey R. Gobas, PE
Principal Engineer

cc Fritz Redlin - Boyle Engineering Corporation
   Tim Joyce - City of Santa Monica
   Jag Salgaonkar - CH2M HILL

OC-C77-100-02

ROUTE

LS _____ DP _____ SC _____
GR _____ MQ _____ TC _____
MR _____ KW _____ DR _____
KC _____ KS _____ WD _____
KL _____ RB _____ LH _____
FL _____ JM _____
FLE: ___________________
XC: ___________________
Mr. Dennis A. Dickerson, Executive Office  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY  
Los Angeles Regional Water Quality Control Board  
101 Centre Plaza Drive  
Monterey Park, CA 91754-2156  

City of Santa Monica Dry Weather Runoff Reclamation Facility Distribution System  
Meeting to Review Reclamation Project Requirements  

Fritz Redlin and I would like to thank you and your staff for meeting with us earlier this week to discuss permitting issues relating to the City of Santa Monica’s proposed Dry Weather Runoff Reclamation Distribution system project. We believe the following points summarize our October 28, 1997 discussion relating to this project:

- The Los Angeles Regional Water Quality Control Board (RWQCB) does not have regulatory procedures in place relating to the use of treated stormwater for landscape irrigation purposes.
- The primary reason why the RWQCB has not adopted procedures for permitting this type of project is because no projects of this nature have been previously proposed.
- The City of Santa Monica’s proposed project is similar in many respects to other Southern California recycled water projects. That being the case, the RWQCB might issue reclamation requirements which include a monitoring program for this project.
- There will be no fee relating to the issuance of the reclamation requirements.
- Prior to issuing the reclamation requirements, the City of Santa Monica should prepare and submit for RWQCB consideration, the monitoring plan for the treatment plant as previously referenced in the Board’s August 22, 1997 letter to Tim Joyce. This plan might need to include provisions for monitoring both the raw stormwater and treated effluent.
- The RWQCB would also like to review the construction plans (when nearing completion of design) for the proposed reclamation distribution system prior to issuance of the reclamation requirements.

It is our understanding that you will addressing these issues in a letter to the City of Santa Monica’s Project Manager, Mr. Tim Joyce (with copies to Boyle and CH2M HILL’s Project Manager Jag Salgaonkar), within the next two weeks. We further understand, that your letter will
comment specifically on what action, if any, you would like the City of Santa Monica to take prior to your issuance of reclamation requirements for this project.

Boyle Engineering Corporation

Harvey R. Gobas, PE
Principal Engineer

cc Winnie Jesena - LARWQCB
Rodney Nelson - LARWQCB
Ahmad Lamaa - LARWQCB
Tim Joyce - City of Santa Monica
Jag Salgaonkar - CH2M HILL
Fritz Redlin - Boyle Engineering Corporation
Bob Carley - Boyle Engineering Corporation
Theresa Hutchings - Boyle Engineering Corporation

OC-C77-100-02
PROPOSED CITY OF SANTA MONICA DRY WEATHER RUNOFF RECLAMATION FACILITY DISTRIBUTION SYSTEM, SANTA MONICA, (FILE NO. 97-161)

Reference is made to the letter from your consultant, Boyle Engineering Corporation, dated October 28, 1997, which proposed to use reclaimed dry weather runoff for landscape irrigation purposes. The source of the runoff for the proposed landscape irrigation distribution system will be tertiary treated water supply from a 0.5 million gallon per day stormwater treatment plant, located adjacent to the Santa Monica Pier. The tertiary treated stormwater will be stored in a 0.3 million gallons subsurface storage tank, with a potable water makeup connection that assures a dependable water supply to the irrigation water users. The irrigation water distribution system will consist of waterlines ranging from four-to-ten inches in diameter and will ultimately serve the following areas:

- Woodlawn Cemetery
- Memorial Park
- Santa Monica College
- John Adams School
- Medians in Olympic Boulevard between 10th Street and 19th Street
- Several Caltrans right-of-way parcels flanking the Santa Monica Freeway between Fourth Street and Nineteenth Street

We have reviewed your consultant's letter and, although this Regional Board does not have regulatory procedures relating to the use of treated stormwater for landscape irrigation purposes, nevertheless, reclamation water projects which use treated sewage, or any other sources of treated wastewater for irrigation purposes require water reclamation requirements and a monitoring and reporting program. Therefore, your proposed project will be similar in many respects to other water reclamation projects within this Region.

If you plan to proceed with the Dry Weather Runoff Reclamation Distribution System project, you must file a Report of Waste Discharge at least 120 days prior to commencing any reclaimed landscape irrigation. We have enclosed copies of Form 200 application/Report of Waste Discharge, which must be filed with this Regional Board. Your Report of Waste Discharge should include a specific monitoring plan and detailed background and technical supporting information. There will be no filing fee associated with the issuance of the reclamation requirements for this project. Within 30 days of receipt of your Report of Waste Discharge, Regional Board staff would inform you in writing of all additional information needed, if any, to complete your application.
if you have any questions, please call Mr. Ahmad Lamma at (213) 266-7560.

Rodney H. Nelson

RODNEY H. NELSON, Chief
Groundwater Regulatory Unit

cc: John Youngerman, Division of Water Quality, State Water Resources Control Board
    Jorge Leon, Office of Chief Counsel, State Water Resources Control Board
    Harvey R. Gobas, Boyle Engineering Corporation
    Fritz Redlim, Boyle Engineering Corporation
    Jag Salgaonkar, CH2M Hill
Mr. Gilbert Borboa  
Manager, Water Division  
City of Santa Monica  
1212 Fifth Street, 3rd Floor  
Santa Monica, CA 90401

Dear Mr. Borboa:

SYSTEM NO. 1910146 - SANTA MONICA DRY WEATHER RUNOFF RECLAMATION FACILITY

On July 7, 1999, we received a copy of the draft report of the April 1999 Engineering Report for Dry Weather Runoff, Reclamation, Storage, Pumping, Distribution, and Recycled Water Use Area Facilities (DWRRF Project). The report was prepared by the Boyle Engineering Corporation to describe and document the proposed nonpotable water use areas involving urban landscape irrigation and conversion of current potable irrigation systems at six sites within the City of Santa Monica. Specifically, tertiary treated dry-weather runoff effluent obtained from the Pico-Kenter and Pier storm drains will be conveyed to the City of Santa Monica for landscape irrigation purposes.

We have reviewed the draft document for the compliance with the 1992 American Water Works Association Guidelines for Distribution of Nonpotable Water. The following comments are offered for your consideration.

1. The Department considers this project to be one that will utilize nonpotable water. The term recycled water should not be used unless it meets the current definition.

2. The DWRRF Project should comply with the City of Santa Monica's Cross-Connection Control Ordinance No. 1385CCS, adopted on September 9, 1986.

3. It is recommended that the City’s representatives, trained in cross-connection control issues, inspect the construction sites during conversion of the existing irrigation system to a non-potable distribution system. These inspections should focus on the avoidance and abatement of cross-connections between the new nonpotable irrigation system and the existing domestic water supply system. Upon construction completion, the City should verify that no cross-connections have occurred by conducting a shutdown and/or pressure test. The City should conduct follow up inspections and shutdown tests with sufficient frequency to assure that cross-connections have not occurred since the time of the last test.
4. The proposed air-gap separation for the make-up 6-inch potable water line should be at least double the diameter of the supply pipe, measured vertically from the flood rim of the receiving tertiary treated dry-weather runoff forebay reservoir.

5. The April 1999 Engineering Report for nonpotable water uses involving urban landscape irrigation of six sites within the City of Santa Monica service area using tertiary treated dry-weather runoff effluent is approved as proposed. The nonpotable use areas covered in the aforementioned engineering report are:
   
   a. Portions of Palisades Park,
   
   b. Olympic Boulevard medians between 11th Street and 19th Street,
   
   c. Woodlawn Cemetery,
   
   d. Memorial Park,
   
   e. Civic Center,
   
   f. Caltrans Santa Monica Freeway right-of way between 4th Street and 17th Street.

6. The April 1999 draft report for the DWRRF Project indicates that the City has considered expanding the nonpotable distribution system and use areas beyond what has been presented in this report (page 1-3, DWRRF Project, 1999). Specifically, the City intends to use the nonpotable water for toilet/urinal flushing in public restrooms located at several City parks and landscape irrigation. It has been brought to our attention that there are several on-site users included in the expansion which are currently utilizing tertiary treated wastewater for such approved recycled water uses as toilet flushing, decorative fountains and landscape irrigation. Therefore, the City of Santa Monica is required to prepare supplemental engineering reports for all additional nonpotable and recycled water use areas to be added in the future. The supplemental engineering reports describing additional irrigation uses other than listed in the April 1999 DWRRF Project should be submitted to our office and to the Los Angeles County Department of Health Services Cross-Connection Program for review and approval.

If you have any questions, please contact Mrs. Grazyna Newton at (213) 580-5734.

Sincerely,

Heather L. Collins, P.E.
District Engineer
Central District
cc:

Boyle Engineering Corporation
1044 E. Herndon Avenue, Suite 108
Fresno, CA 93720
Att: Harvey R. Gobas, P.E.
Principal Engineer

and

Gunter A. Redlin, P.E.
Principal Sanitary Engineer

Spiros A. Lazaris
City of Santa Monica
Civil Engineering Division
525 Broadway, Suite 100
Santa Monica, CA 90401

Paul S. Gonzales, Jr.
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Lloyd Huff
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2525 Corporate Place
Monterey Park, CA 91754