2017 WATER MASTER PLAN UPDATE

FOR

LA PUENTE VALLEY
COUNTY WATER DISTRICT

LOCATED AT

112 N 1st STREET
LA PUENTE, CA 91744

Prepared By:

Civlitec Engineering, Inc.
&
La Puente Valley County Water District

Submitted: May 2017

EXECUTIVE SUMMARY

The La Puente Valley County Water District (LPVCWD) owns and operates a water supply, treatment, and distribution system that serves portions of the City of La Puente and the City of Industry. LPVCWD's mission is

"*To provide its customers with high quality water for residential, commercial, industrial and fire protection uses that meets or exceeds all local, state and federal standards and to provide courteous and responsive service at the most reasonable cost*."

LPVCWD staff and Civiltec Engineering, Inc., developed the Water Master Plan (WMP) to provide LPVCWD guidance for long-term planning, recommendations for Capital Improvement Projects (CIP), and a working Hydraulic Model to assess the water system with respect to pressure, capacity, compliance, and efficiency.

The District recognizes that identifying requisite improvement projects and managing costs is essential to the District's Mission. The WMP shall be utilized by the District to prepare and complete selected projects identified therein, which shall be independently approved by the District's Board of Directors. The WMP will also be utilized by the District to support a cost of service analysis, which will serve as the basis for the District's water rates moving forward.

2017 WATER MASTER PLAN

The WMP addresses and evaluates LPVCWD's system through various chapters as listed below:

- **Chapter 1: Introduction** – Provides a general overview of LPVCWD along with the study area, study period, and scope of the 2017 WMP
- **Chapter 2**: **Land Use and Water Requirements –** Summary of land use planning as it influences LPVCWD
- **Chapter 3**: **Sources of Supply** – Summary of sources and alternative sources at LPVCWD
- **Chapter 4**: **Water Quality** – Status and potential impacts of water quality on the LPVCWD water system
- **Chapter 5**: **Existing Water System** – Summary of existing system components
- **Chapter 6**: **Computer Model** – Description of the computer modeling program used to model LPVCWD's water system
- **Chapter 7**: **Water Conservation Programs** – Provides guidance for the implementation of water conservation programs in line with LPVCWD's goals
- **Chapter 8**: **Evaluation Criteria –** List the design and planning criteria used to (1) evaluate the existing distribution system and (2) for recommending improvements
- **Chapter 9**: **Analysis and Proposed Improvements** – Evaluates the current system and provides a CIP aimed to resolve hydraulic issues and cyclical replacement

FINDINGS

As summarized and discussed in the 2017 WMP, LPVCWD's water system can be categorized as in "good condition" based on the following findings:

- **Water Demands** - Over the past 20 years, the number of service connections increased at an average rate of approximately 1% per year. This growth rate is based on the similar growth rates identified in the LPVCWD's historic number of service connections and the projected long-term growth rate in the City of La Puente. The projected average rate of increase of water demand over the next 20 years is approximately 21.6%.
- **Water Quality** – LPVCWD's Treatment Plant can treat its source water to meet all current state and federal drinking water quality regulations for the next 10 years, with the exception of Nitrate. Based on historical data and future Nitrate concentration projections, LPVCWD should have a treatment plan in place to treat for Nitrate at Well #3.
- **Water Conservation** – To reduce the reliance of imported water supplies, the top 5 potential water use reduction projects for consideration at LPVCWD involve a Recycled Water System, Leak Detection and Repair, Smart Meters, Turf Removal, and Residential Ultra Low Flow Toilets.
- **Source of Supply** - Based on current and future demand projections, LPVCWD's source of supply has a slight surplus under primary supply design criteria (largest source out of service) and over a 7,000 gpm surplus under secondary supply design criteria (with all sources available, including interconnections).
- **Storage Facilities** – LPVCWD system has adequate storage supply to meet fire flow demands, maximum day demands, and peak hourly demands.
- **Pumping Facilities** - Per supply design criteria, there should be sufficient booster pumping capacity in each pressurized zone without gravity storage to meet (1) combined production capacity of maximum day demand (MDD) with fire flow at 20 psi, and (2) Peak Hourly Demand (PHD) at a minimum system pressure of 40 psi. After analyzing all booster station facilities, the only booster station that wasn't able to achieve its dependent MDD requirement with fire flow was the Hudson Booster Station by a deficit of approximately 300 gpm.
- **Distribution System** - The primary function of a distribution system is to carry supply to where it is needed. The hydraulic model analysis proved that 1% of fire hydrants were not able to meet current fire code supply demand. The identified hydrants (1%) that did not meet current fire standards were constructed during the 1950's and 1960's under a different fire code requirements.

  After assessing the distribution system, 85% of the system's waterlines will reach maturity in 18 years. It is recommended that LPVCWD consider a pipe replacement programs that starts at 0 in 2016 and increases by 380 feet per year until 2034.

Acknowledging the aforementioned and the recommended improvements identified in the WMP, in the next 10 years, LPVCWD's capital improvement project cost are estimated at $6.5 million dollars and $2.8 million dollars for maintenance projects.

CHAPTER ONE - INTRODUCTION

CHAPTER TWO – LAND USE AND WATER REQUIREMENTS

CHAPTER THREE – SOURCES OF SUPPLY

CHAPTER FOUR – WATER QUALITY

CHAPTER FIVE – EXISTING WATER SYSTEM

FIGURES

TABLES

CHAPTER ONE – INTRODUCTION

1.1 General Description

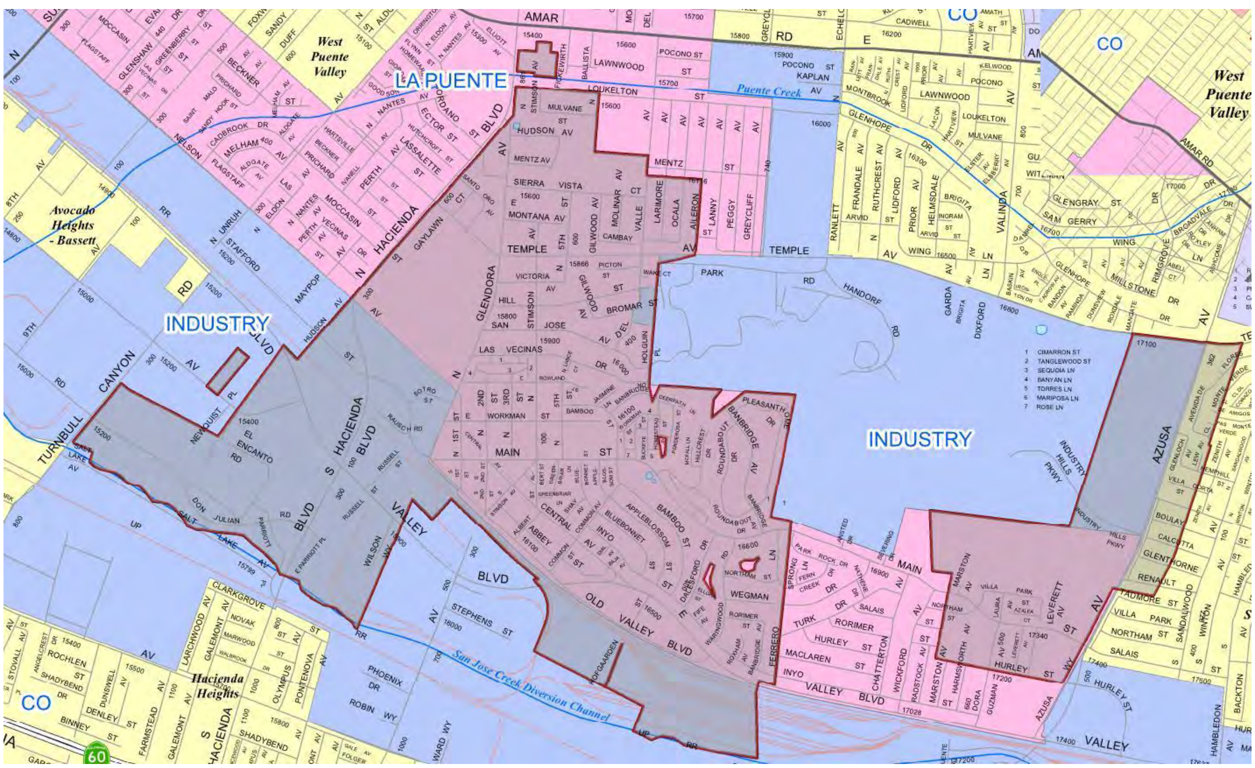
This Water Master Plan (WMP) is a stand-alone living document intended to provide comprehensive analysis of the La Puente Valley County Water District (LPVCWD) water system. Any recommendations for capital improvements are made from the perspective of the historical data available and at the time of the WMP's preparation.

LPVCWD maintains interconnectivity with nearby water suppliers primarily supported by numerous interconnections with the City of Industry Waterworks System (CIWS). As a result, benefits in supply, storage and distribution are achieved by coordinating operation between both systems that will enable LPVCWD to maximize redundancy and minimize or delay the cost of improvements wherever possible.

1.2 Study Area

The LPVCWD serves portions of the City of La Puente and the City of Industry, as well as unincorporated portions of Los Angeles County. The boundary map of the service area is provided in **Figure 1-1.**

Figure 1-1 – Boundary Map of LPVCWD



In addition, LPVCWD manages and operates the City of Industry Waterworks System (CIWS), which includes 1,860 residential service connections, 34.4 miles of distribution and transmission mains, 1 active Well, 5 booster pump stations, and 3 reservoirs.

1.3 Study Period

Historical data for the six-year period, from calendar years 2010 to 2016, is considered as representative of existing conditions. This period has been referenced herein as the Study Period.

1.4 Scope of Report

Following are the tasks completed as part of this master planning project.

1.4.1 Land Use and Water Requirements

Land Use Analysis

Civiltec acquired and reviewed the land use elements of the General Plans for the City of La Puente, City of Industry and the Los Angeles County Department of Regional Planning in order to determine the planners' vision for development within the LPVCWD water system boundary. ***Civiltec*** summarized and delineated existing land use designations by acreage and number of parcels.

Civiltec acquired and reviewed the latest Southern California Association of Governments (SCAG) Land Use Database for Los Angeles County with regard to those parcels served by LPVCWD. The SCAG Land Use Database uses a Modified Anderson Land Use Classification system, which represents actual and specific land use based on aerial survey.

Water Demand Analysis

Civiltec acquired, reviewed, analyzed, and reconciled customer billing data, water production data and telemetry for the Study Period, as available. This analysis provided an understanding of demand on a pressure zone by pressure zone basis.

Impact of Pending Development (aka Near-Term Development)

An understanding of near-term development is important for determining an appropriate level of developer contribution. In addition to onsite improvements, developers should be responsible for mitigating offsite impacts to the system.

Civiltec contacted the City of La Puente, the City of Industry and Los Angeles County regarding pending development within the existing service boundary.

1.4.2 Establishment of Evaluation Criteria

Early in the planning process, ***Civiltec*** issued a memo detailing proposed Design Criteria and Planning Criteria based on research of previous planning efforts, industry standards, compliance requirements, and input from LPVCWD staff provided at the Kick-Off meeting. ***Civiltec*** coordinated a follow-up meeting with LPVCWD staff to establish and adopt Design Criteria and Planning Criteria to be used as a baseline for determining the adequacy of existing infrastructure to meet current and pending development demands.

Design Criteria

Design Criteria deals with parameters related to the proper sizing and configuration of infrastructure from a hydraulic point of view. The concepts of system performance, system redundancy, customer expectations, regulatory compliance, and emergency preparedness will be built into the criteria, which will target the following areas of concern: supply, storage, transmission, system pressure, and fire flow.

Planning Criteria

Planning Criteria deals with parameters related to cyclical infrastructure replacement due to age and condition. The primary concern of Planning Criteria is to establish the practical service life of each system component and a performance indicator to verify whether maintenance or replacement will result in an economic benefit. These performance indicators may include efficiency, reliability and maintenance history.

1.4.3 Hydraulic Modeling

A hydraulic computer model (Water Model) is an important tool for assessing the distribution system with respect to capacity, compliance, efficiency, and surge. A number of tasks are necessary to construct the new Water Model up to a level where LPVCWD can have confidence in the results it generates, as delineated in the following subsections.

Water Model Construction

- ***Civiltec*** programed all pipes including diameter, length, material, estimated roughness and installation date.
- ***Civiltec*** programed all junctions (i.e. connections between pipe ends) including elevation and designation (e.g. demand node, fire hydrant location, facility, etc.).
- ***Civiltec*** programed all Well and booster pumps including elevation, design head and flow per the latest efficiency test, operational settings, and installation date.
- ***Civiltec*** programed all control valves including elevation, size, and function (i.e. flow control, pressure reducing, pressure sustaining, etc.).
- ***Civiltec*** programed all tanks including base elevation, high water line, dimensions and construction date.
- ***Civiltec*** allocated demand to the nearest demand node based on the water demand analysis.

Steady State Calibration

- Steady state simulation is appropriate for any analysis that may be considered a snapshot in time, such as examining system performance under peak or emergency conditions.

- Steady state calibration involves verifying vertical control (i.e. the elevations of junctions, tanks and facilities) and adjusting pipe roughness to match actual flow characteristics. Following Water Model construction, ***Civiltec*** calibrated it against steady state field data to assure that simulation results reflect actual system performance.

- Field testing was performed at various locations to be determined in coordination with LPVCWD staff (This represents one test in each pressure zone; additional field testing may be performed to improve confidence in the Water Model). A field test consisted of pressure monitoring at two locations before and during a hydrant flow test at a third location. The collected field data at each test location is composed of pressure readings at appropriate locations, pitot tube readings at the flow hydrant, flow test time and duration, flow stream observations (i.e. more or less turbulent), and other boundary conditions that would have an impact on the test result such as tanks levels, pump and valve flow. To the extent feasible, field testing was completed with pumps turned off and gravity storage as the primary source of supply. In cases where there is no gravity storage or where gravity storage is insufficient to support normal operations on its own, telemetry data was used to define the boundary conditions during the test. In the absence of telemetry data at the pressure zone level, a methodology for estimating boundary conditions was devised and applied.

- Estimated roughness was assigned to each pipe in the Water Model based on AWWA[1] and/or Army Corps of Engineers[2] recommendations for pipe material and age. Incremental adjustments were made to the estimated roughness on a global basis until a best fit is achieved. The target tolerance for calibration is plus or minus 5 psi or 5% of static pressure at each test location. The calibration process and the raw field test data is provided in an **Appendix D** in the final WMP report.

Demand Allocation for Simulation

- ***Civiltec*** developed demand allocation to the Water Model across three dimension: (1) scale, (2) simulation type and (3) projection in time. When testing the capacity of the system against design criteria, an appropriate combination of these demand dimension will be applied to the simulation.

- *Scale* was designated as peak hour demand (PHD), maximum day demand (MDD), average day demand (ADD), and minimum day demand (Min Day).

[1] American Water Works Association. (2012). *Manual of Water Supply Practices-M32: Computer Modeling of Water Distribution Systems*.

[2] Walski et al. (1988). *Predicting Internal Roughness in Water Main: EL-88-2*.

- *Simulation type* was designated as Steady State. Steady State means a discrete demand allocated to each demand node.

- *Projection in time* considers (1) existing conditions, and (2) conditions following completion of known development projects (aka near-term).

Scenario Development

- A Water Model scenario is a combination of modeling databases that represents a set of fixed and variable data describing the conditions of a simulation. Scenarios were programmed and stored in the Water Model to simulate conditions described by the design criteria. Simulation results represent system capacity and were compared system requirements in the evaluation process.

- *Fixed data* do not change with time, and are generally described as infrastructure (i.e. the location, alignment, geometry and connectivity of pipes, pumps, valves, tanks and aquifers). The Water Model stores fixed data as Element Databases, and the modeler selects precisely which elements to include in a simulation by defining a Facility Set (i.e. a collection of Element Databases).

- *Variable data* are subject to change with time, including pump or valves settings and controls, demand, supply availability, aquifer depth, etc. The Water Model stores variable data as Data Subsets, and the modeler selects precisely which variable data to include in a simulation by defining a Data Set (i.e. a collection of Data Subsets).

Steady State Simulation

- ***Civiltec*** simulated fire flow under MDD conditions at each hydrant location to determine system capacity relative to the fire marshal's requirements. Care was taken to accurately apply allowances for multiple hydrants providing coverage to commercial, industrial and institutional (CII) areas.

1.4.4 Supply Analysis

Review of Sources of Supply

- ***Civiltec*** defined the supply portfolio serving the needs of LPVCWD based on current agreements, rights and contracts.

- ***Civiltec*** examined alternative sources of supply.

- ***Civiltec*** rated all current and alternative sources of supply in terms of reliability, sustainability and availability.

Future Supply Requirements

- ***Civiltec*** evaluated the capacity of current sources of supply against design criteria under existing and near-term demand conditions.

Supply to Pressure Zones

- ***Civiltec*** evaluated the capacity of current supply to each pressure zone against design criteria under existing and near-term demand conditions.

1.4.5 Facility Analysis

Production Infrastructure

- Production infrastructure generally consists of Wells, raw water transmission pipelines, treatment and imported water connections. ***Civiltec*** evaluated the capacity of production infrastructure against design criteria under existing and near-term demand conditions.

Emergency Supply Infrastructure

- Generally, emergency supply consists of interconnections with neighboring purveyors and secondary connections with wholesalers. ***Civiltec*** identified all sources of emergency supply by source, location, direction of flow, capacity, governing agreements, and historical usage. ***Civiltec*** provided a facility description of each identified emergency supply source.

Booster Pumping Stations

- ***Civiltec*** reviewed pump efficiency tests for all booster pumps and evaluated their current performance relative to the manufacturer's performance curves, as available.

Storage

- The storage analysis focused on the adequacy of existing storage to provide for emergency, firefighting and operational purposes as defined by design criteria under existing and near-term demand conditions.

Pressure Reducing Stations

- Pressure reducing stations that serve as normal sources of supply to a pressure zone or sub-zone were evaluated against design criteria relative to their capacity to deliver the range of expected normal and emergency flows per the continuous and intermittent flow rating the valve or valves in the station under existing and near-term demand conditions.

- Pressure reducing stations that serve as emergency sources of supply were evaluated against design criteria relative to their capacity to deliver emergency flows per the intermittent flow rating of the valve or valves in the station while operating in tandem with other emergency sources under existing and near-term demand conditions.

Treatment and Blending

- ***Civiltec*** reviewed the adequacy of existing treatment and blending facilities operated by LPVCWD with respect to water quality and capacity.

Disinfection

- ***Civiltec*** examined the adequacy of existing disinfection stations with respect to their capacity to maintain a residual throughout the system while operating within the Division of Drinking Water (DDW) parameters.

1.4.6 Distribution System Analysis

Transmission Pipelines

- Transmission pipelines are intended to efficiently transport large volumes of water between facilities. ***Civiltec*** examined the efficiency and capacity of these pipelines to deliver normal flow under existing and near-term demand conditions.

Distribution Pipelines

- Distribution pipelines are intended to deliver water to end users and fire hydrants. ***Civiltec*** examined the efficiency and capacity of these pipelines to deliver normal and emergency flow under existing and near-term demand conditions.

1.4.7 Water Quality Requirements

Assessment of Trends

- ***Civiltec*** analyzed water quality trends that impact the current sources of supply.

Legislative and Regulatory Review

- ***Civiltec*** stays abreast of local, state and federal water quality legislation and regulation through a variety of public policy sources. ***Civiltec*** identified and discussed new and pending water quality legislation and regulation that may impact LPVCWD operations, facilities or policies. ***Civiltec*** identified and described those legislative and regulatory initiatives that may impact LPVCWD.

Legislative and Regulatory Impacts

- Based on our review of new and pending water quality legislation and regulation, ***Civiltec*** described the potential impacts in physical, operational and economic terms.

1.4.8 Planning Analysis

Planning criteria use two factors to identify system components whose replacement would create a net benefit. The first factor is age and is derived from the average historical replacement cycle for a system component. This implies that some components are replaced prior to the average cycle and others last longer than the average cycle. As such, age by itself is insufficient to determine whether a system component should be replaced. The second factor is a performance indicator. As performance drops off, the benefit of replacement increases. A combination of age and performance provides a solid foundation for determining the benefits of replacement.

Replacement Budgeting and Scheduling

- Based on statistical analysis of assets and service life cycle, ***Civiltec*** estimated the frequency and cost of expected equipment and infrastructure replacement for budgeting and scheduling purposes.

Identification of Capital Replacement Projects

- ***Civiltec*** developed a methodology for identifying capital replacement projects for Wells, pipelines, pumps and tanks.

Identification of Cyclical Maintenance Requirements

- ***Civiltec*** developed a methodology for identifying cyclical maintenance requirements for tank coatings, pump overhauls, valve refurbishments, meter replacement and maintenance of other appurtenances.

1.4.9 Capital Improvement Program (CIP)

Cost Estimating Framework

- ***Civiltec*** established a uniform cost estimating methodology suitable for planning purposes. To the extent feasible, the methodology was based on historical records provided by LPVCWD and ***Civiltec***'s experience with related projects.

Identification of Deficiencies

- Based on hydraulic evaluation and cyclical replacement analysis, ***Civiltec*** identified system deficiencies and recommend mitigation as a series of projects and programs. Each project or program was discussed individually and included a description, a justification, a priority, and a cost estimate. As applicable, project descriptions may also include opportunities for synergy, alternative solutions, qualification for alternative funding options, and recommendations for field verification or further study.

Presentation of the CIP

- ***Civiltec*** presents the CIP in tabular form by type in accordance with LPVCWD preferences for organization and budgeting.

1.4.10 Water Conservation

Water Conservation Goal Review

- ***Civiltec*** reviewed the water conservation goals for LPVCWD, the City or any other jurisdiction that may impact water reduction within the water system boundary.

1.5 Abbreviations

The following abbreviation appear in this report:

ADD	average day demand
AFY	acre-feet per year
AF	acre-foot
AWWA	American Water Works Association
BP	Heavy Commercial/Business Park
BPS	booster pump station
CC	Community Commercial
CC&N	certificate of convenience and necessity
CFS	cubic foot per second
CIP	Capital Improvement Project
CIWS	City of Industry Waterworks System
DDW	Division of Drinking Water
DU	dwelling unit
ft	feet
GIS	geographic information system
gpm	gallons per minute
HDR	High Density Residential
HGL	hydraulic grade line
HP	horsepower
HWL	high water line
in	inches
INST	Institutional
L	liter
lbs	pounds
LDR	Low Density Residential
LPVCWD	La Puente Valley County Water District

LWL	low water line
MDD	maximum day demand
MDD+FF	maximum day demand plus fire flow
MDR	Medium Density Residential
MFR	multi-family residential
MGD	millions of gallons per day
MG	milligram
MSGB	Main San Gabriel Basin
MTR	meter
MWD	Metropolitan Water District of Southern California
OS	Open Space
PD	Planned Development
PF	peaking factor
PHD	peak hour demand
PPB	parts per billion
PPM	parts per million
PRV	pressure reducing valve
psi	pounds per square inch
RFI	request-for-information
SCAG	Southern California Association of Governments
SDWA	Safe Drinking Water Act
SFR	single family residential
UDF	unit demand factor
USGVMWD	Upper San Gabriel Valley Municipal Water District
WDF	water duty factor
WMP	Water Master Plan
µg	Microgram

1.6 Conversions

Various units of measure are used for efficient communication of quantities related to and included in engineering calculations. For purposes of consistency, the units referred to in this WMP, their typical usage and their conversions to equivalent units are provided in the sections below.

1.6.1 Volumetric Flow Rate

Volumetric flow rate is presented with a variety of different units depending on context. Volumetric flow rate is generally expressed as a unit of volume per unit of time. The following volumetric flow rate units appear in this report:

Gallons per Minute (GPM)

GPM is commonly used to describe the flow capacity of a pump, valve, fire hydrant or other appurtenances. This unit was used to program the Water Model.

Cubic Foot per Second (CFS)

Metropolitan Water District of Southern California (MWD) typically rates the capacity it its interconnections in terms of CFS. This unit is often used for scientific calculations and for describing the capacity of structures that experience relatively high instantaneous flows (i.e. rivers, weirs, channels, spillways, transmission pipelines, etc.).

Acre-feet per Year (AFY)

When discussing volumetric flow over a long period of time, AFY is often used. Examples of the use of AFY include recharge of an aquifer, seasonal demand associated with agricultural irrigation, the conversion of a snowpack into melt, and management of large surface reservoirs.

Million Gallons per Day (MGD)

Certain facilities are designed to accommodate a daily cycle and include adequate retention to equalize normal fluctuation throughout the day.

Table 1-1 provides conversions for the above volumetric flow rates.

Table 1-1 – Volumetric Flow Rate Conversions

Conversion	GPM	CFS	AFY	MGD
1 GPM equals	1	0.002228	1.613	0.00144
1 CFS equals	448.9	1	724.0	0.6464
1 AFY equals	0.620	0.001381	1	0.000893
1 MGD equals	694.4	1.547	1120.1	1

1.6.2 Volume

Volume is presented with a variety of different units depending on context. The following units of volume appear in this report (with a brief description):

- Gallon – standard U.S. measurement
- Cubic foot (CF) – standard U.S. scientific measurement
- Acre-foot (AF) – typical annual supply measurement

- Liter (L) – scientific measurement in metric

Table 1-2 provides conversions for the above volumes.

Table 1-2 – Volume Conversions

Conversion	Gallon	CF	CCF	AF	L
1 Gallon equals	1	0.1337	0.001337	3.069×10^{-6}	0.2642
1 CF equals	7.481	1	0.01	2.296×10^{-5}	28.32
1 CCF equals	748.1	100	1	0.002296	2,832
1 AF equals	325,872	43,560	435.6	1	1,233,480
1 L equals	3.785	0.03531	0.0003531	8.107×10^{-7}	1

1.6.3 Other Units

Other common units of measure that may be found in this report include:

- Milligrams per liter (mg/L), which is equivalent to parts per million (PPM)
- Micrograms per liter (µg/L), which is equivalent to parts per billion (PPB)
- Pounds (lbs)
- Mile = 5,280 feet
- Foot = 12 inches

1.7 Acknowledgments

We, at **Civiltec engineering inc.**, would like to express our appreciation for the cooperation and valuable assistance of the LPVCWD management and staff. In particular, the efforts of the following individuals proved to be invaluable:

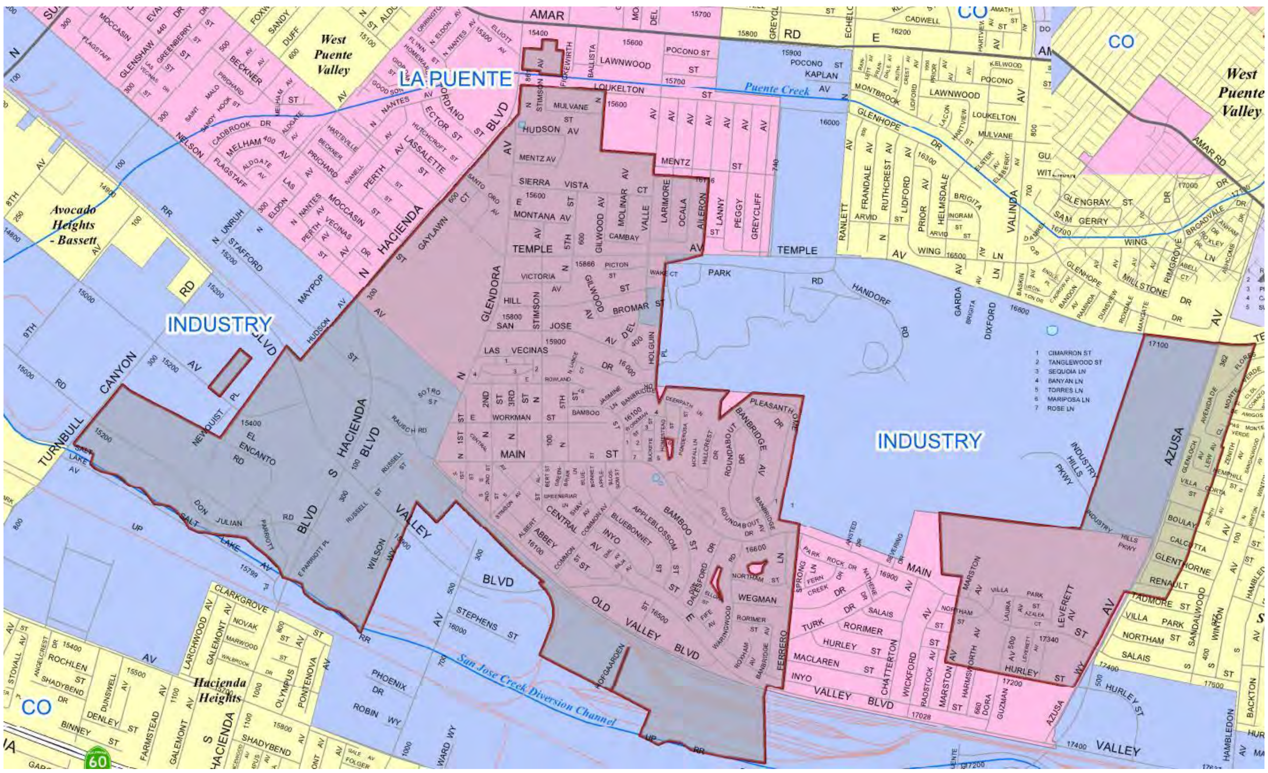
- Greg Galindo – General Manager
- Cesar Oritz – Water Production & Treatment Supervisor
- Roy Frausto – Compliance Officer / Project Engineer

CHAPTER TWO – LAND USE & WATER REQUIREMENTS

2.1 General Description

Chapter 2 summarizes the context for Land Use planning as it influences LPVCWD. LPVCWD serves portions of the City of La Puente and City of Industry, as well as unincorporated portions of Los Angeles County. The boundary map of the service area is provided in **Figure 2-1.**

Figure 2-1 – Boundary Map LPVCWD



2.2 Land Use Analysis

Land use within LPVCWD's service area in the City of La Puente is primarily residential with some commercial, institutional and open space areas. In the City of Industry, demand is primarily commercial and industrial. Within the unincorporated areas of Los Angeles County, land use is primarily residential.

The LPVCWD's service area in the City of Industry is believed to be fully build out. Therefore, when considering potential growth rates for the LPVCWD as a whole, the population of the City of La Puente is used as a key indicator. The population of La Puente has fluctuated minimally since the year 2000. During the 14-year period of 2000-2014, the city's total population has decreased by 1.4% from 41,063 to 40,478.[1]

[1] 2015 SCAG Profile of the City of La Puente http://www.scag.ca.gov/Documents/LaPuente.pdf

2.3 Pending Development

On January 22, 2016, the Planning Division of La Puente began reviewing an application of future development (Plan Development Permit, Agreement and Tentative Tract Map) for a 4.5-acre lot consisting of 45 detached single family homes at 747 Del Valle Avenue. [2]

2.4 Water Demand

Water production capacity must be capable of satisfying all water demands and water losses. Water demands are considered to be the sum of all water delivered to customers and billed for at a commodity rate. Water losses include water uses whose revenue cannot be recovered through activities such as water quality sampling, flushing, pumping to waste, hydrant testing, fire suppression, unmetered construction water and street cleaning water. Water losses also include other forms of unaccounted water such as leaks, reconciliation of inaccurate meters, unauthorized uses, pipe breaks and undocumented maintenance.

For purposes of this Water Master Plan, the term water demand refers to the level of water production necessary to satisfy customer demands and typical losses. Water losses are not referred as a separate category or water use; rather, they are considered a functional reality of managing a distribution system that must be considered when projecting requirements and recommending improvements.

An understanding of demand fluctuation is key to appropriate sizing of infrastructure and facilities. The following sections provide analysis of steady state and dynamic demand fluctuation.

As of 2015, the LPVCWD had 2,568 service connections consisting of 2,058 residential, 400 commercial, 12 industrial, and 98 irrigation service connections.[3]

2.4.1 Current Water Demand

From 2010 to 2016, the average yearly water usage was approximately 1,691.66 AF. For the years 2010 through 2016, the annual water use data, as provided by LPVCWD, are shown in **Table 2-1**. From 2010 to 2014, water usage increased due to population increase and other elements; however, the usage decreased in 2015 and 2016 as a result of emergency water conservation measures.

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[2] Planning Division of City of La Puente

[3] LPVCWD 2015 Annual Report to the State Drinking Water Program LPVCWD

Table 2-1 – Current Water Demand

Year	Water Use (AFY)	Water Use (gpm)
2010	1,609.06	996.89
2011	1,736.83	1,076.05
2012	1,773.61	1,098.84
2013	1,934.91	1,198.77
2014	1,868.42	1,157.58
2015	1,484.08	919.46
2016	1,434.70	889.46
Average	1,691.66	1,069.60

2.4.2 Steady State Peaking Factors

For planning purposes, there are three steady state conditions of interest: (1) Average Day Demand (ADD), (2) Maximum Day Demand (MDD) and (3) Peak Hourly Demand (PHD). The values of these peaking factors are calculated in the following chapters of the Water Master Plan.

Calculation of Average Day Demand

Utilizing the procedures for determining ADD as outlined by the California Regulations Related to Drinking Water, §64554 (b) (3), the average water usage between 2010 through 2016 was averaged to yield an ADD of 4.63 AF.

ADD serves as a benchmark and a planning tool for long-term issues at the system level, such as supply acquisition and integrated resources management.

Calculation of MDD and PHD Peaking Factors

MDD serves as a planning tool at the pressure zone level. MDD is the peak loading for typical booster-reservoir pressure zones for analysis of supply requirements. The maximum day demand was calculated using data provided by LPVCWD between 2010 through 2016. The average MDD of these years is 10.23 AF. The peaking factor is the ratio of the MDD to ADD (2.21).

In large pressure zones, the demographic diversity of the connections creating the demand tends to mediate the degree of variation between ADD and MDD. For example, in Zone 1 of the LPVCWD system (the largest zone), the standard peaking factor of 2.21 can be considered adequate for planning purposes. However, in smaller zones such as Zone 5, with just 10 connections, user demographics tend to be much less diverse, and MDD can vary much more significantly, sometimes by as much as a factor of 8.

MDD is also used to help define certain emergency conditions, especially MDD plus Fire Flow.

PHD serves as a planning tool at the pipe level. Pipes must function adequately under this loading. Also, PHD is the peak loading for sub-zones (e.g. Zones 1A and 2A) for analysis of supply requirements.

A peaking factor is the ratio of the target demand to ADD (3.31). Peaking factors were derived by analyzing data to develop an understanding of pressure zone level demand, sorting for the peak day and peak hour, and scaling to account for the historical peak month production and for attenuation. **Table 2-2** summarizes an analysis of actual water use data during the study period.

Table 2-2 – Peaking Factors

Demand Condition	Code	MGD	GPM	PF
Average Daily Demand	ADD	1.55	1,075	1.00
Maximum Daily Demand	MDD	3.42	2,373	2.21
Peak Hour Demand	PHD	5.13	3,559	3.31

2.4.3 Future Water Demand

Over the past 20 years, the number of service connections increased at an average rate of approximately 1% per year. This growth rate is based on the similar growth rates identified in the LPVCWD's historic number of service connections and the projected long-term growth rate in the City of La Puente. The future water demand over the next 20 years, including ADD and MDD, is shown in **Table 2-3**.

Table 2-3 – Existing and Future Water Demand

Year	Water Use (AFY)	ADD (gpm)	MDD (gpm)
2015	1,735	1,075	2,373
2020	1,822	1,129	2,492
2025	1,914	1,186	2,617
2030	2,010	1,245	2,748
2035	2,110	1,307	2,885
Increase	375	232	512
% Increase	21.6 %		

The LPVCWD system is composed of 5 different water pressure zones. The future ADD water use in AFY by each pressure zone will be utilized for future urban planning, infrastructure improvements, facility improvements, and so on. The future water use within LPVCWD's pressure zones over the next 20 years is shown in the **Table 2-4**. In addition, future ADD and MDD water use presented as gpm within LPVCWD's pressure zones over the next 20 years is shown in **Table 2-5**.

Table 2-4 – Future LPVCWD Water Use by Zones (AFY)

Year	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
2015	1,161	499	28	41	6	1,735
2020	1,219	523	30	43	7	1,822
2025	1,280	550	32	45	7	1,914
2030	1,345	578	33	47	7	2,010
2035	1,412	606	35	49	8	2,110

Table 2-5 – Future ADD and MDD by Zones (gpm)

Scenario	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
2015						
ADD	719	309	18	25	4	**1,075**
MDD	1,588	682	38	56	9	**2,373**
2020						
ADD	755	325	19	26	4	**1,129**
MDD	1,667	716	41	59	9	**2,492**
2025						
ADD	793	340	20	28	5	**1,186**
MDD	1,751	752	43	61	10	**2,617**
2030						
ADD	833	357	21	29	5	**1,245**
MDD	1,838	790	45	65	10	**2,748**
2035						
ADD	874	375	22	31	5	**1,307**
MDD	1,930	829	48	68	11	**2,886**

Based on the water use data between 2010 and 2016, the percentage of water use per each pressure zone is presented in **Table 2-6.**

Table 2-6 – Water Usage Percentage of Each Zone

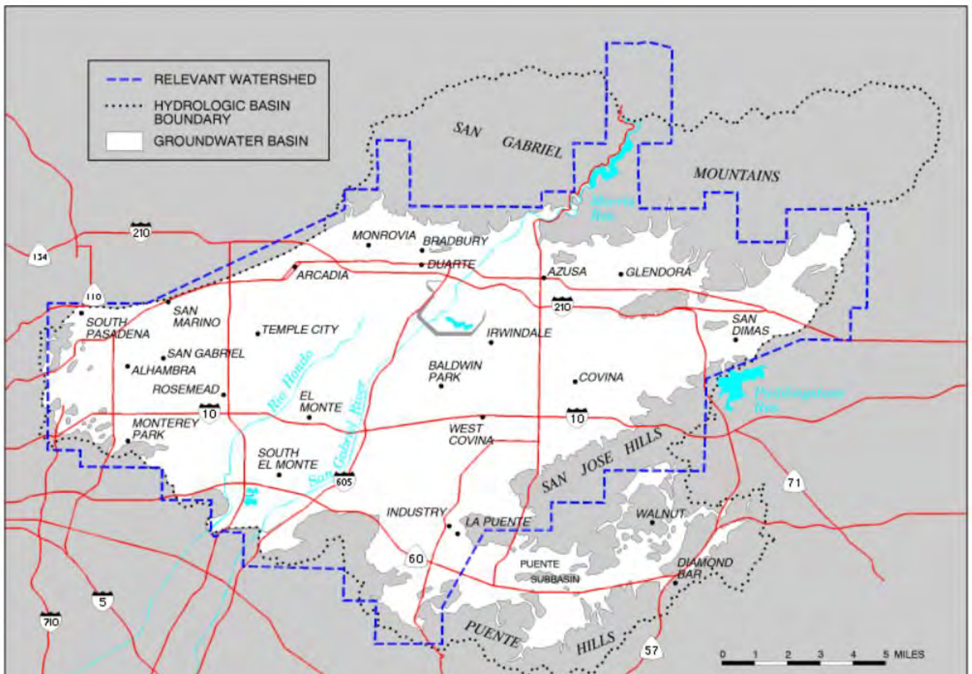
Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Total
66.9 %	28.7 %	1.68 %	2.34 %	0.38 %	100 %

CHAPTER THREE- SOURCES OF SUPPLY

3.1 General Description

LPVCWD's preferred non-emergency source of supply is from three groundwater Wells that produce water from the adjudicated Main San Gabriel Basin (MSGB). The Main San Gabriel Groundwater Basin is bounded by the San Gabriel Mountains to the north, San Jose Hills to the east, Puente Hills to the south, and by a series of hills and the Raymond Fault to the west. The boundary map of MSGB is provided in **Figure 3-1**. The watershed is drained by the San Gabriel River and Rio Hondo, a tributary of the Los Angeles River. Surface area of the groundwater basin is approximately 167 square miles. The fresh water storage capacity of the basin is estimated to be about 8.6 million acre-feet[1]

Figure 3-1 – The Boundary Map of MSGB



Source: Main San Gabriel Basin Watermaster website (http://www.watermaster.org/basinmap.html)

3.2 Water Rights and Agreements

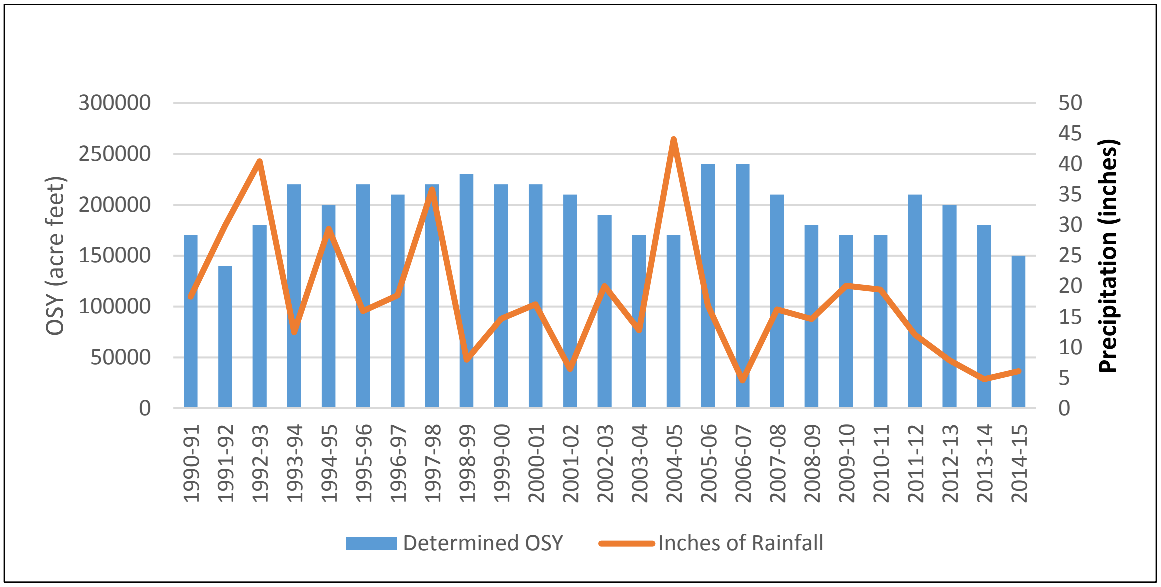
On January 4, 1973, LPVCWD was adjudicated 1,097.00 acre-feet of water rights based on groundwater production that occurred between calendar years 1953 and 1967, inclusive. Subsequently, LPVCWD obtained the water rights of El Encanto Properties on July 22, 1974, in the amount of 33.40 acre-feet. Thus, LPVCWD's total adjudicated water rights were set at 1,130.40 acre-feet (0.57197%) of all adjudicated water rights in the Basin. Amendments to the adjudication were approved on June 21, 2012. The amendments worked to expand conjunctive

[1] Main San Gabriel Basin Watermaster Annual Report 2014-2015 **Appendix B** Page B2 of 6

use of groundwater and surface water for future use, to enhance long-term sustainability of water supplies. The Amended Judgement, including a list of adjudicated water rights, is included as **Appendix A.**

Over time, as rainfall has fluctuated, the MSGB Watermaster has adjusted the Operating Safe Yield (OSY) accordingly. Data for the last 25 years can be seen in **Figure 3-2**[2].

Figure 3-2 – Rainfall Precipitation (in)



The OSY for 2015-2016 is currently set at 150,000 AF. LPVCWD's 0.57197% of this total is equal to 857.955 AF.

Utilizing the Metropolitan Water District of Southern California (MWD) distribution system, the Upper District provides water to the MSGB Watermaster[3].

3.2.1 Alternative Sources

LPVCWD maintains 11 interconnections with surrounding water purveyors. Nine (9) of these interconnections provide emergency backup supply to LPVCWD and provide the surrounding purveyors with emergency backup supply. When LPVCWD's Wells are down for maintenance or other reasons, LPVCWD receives water from adjacent water purveyors via these interconnections. Currently, there is only a single 8-inch pipeline that connects the eastern portion of LPVCWD's distribution system (Zone 2) with LPVCWD's treated water supply. Interconnections from City

[2] Main San Gabriel Basin Watermaster Report on Preliminary Determination of Operating Safe Yield For 2015-16 Through 2019-20

[3] http://upperdistrict.org/about/service-area/

of Industry and Rowland Water District (RWD) provide the backup supply to the eastern portion of LPVCWD. The information of alternative source is provided in **Table 3-1**.

Table 3-1 – Location of Alternative Sources

Connection	From - To	Type	Size	Zone Served	Capacity (gpm)	Status
Suburban Water Systems N. Hacienda Blvd. & Loukelton St.	SWS - LPVCWD	Groundwater	6”	Zone 1	700	Active
Suburban Water Systems Azusa Way & Hurley St.	LPVCWD - SWS	Groundwater	6”	Zone 2	500	Emergency
San Gabriel Valley Water Co. Don Julian Rd. & Turnbull Canyon Rd.	SGVWC - LPVCWD	Groundwater	8”	Zone 1	1,200	Active
San Gabriel Valley Water Co. Proctor Ave. & El Encanto	SGVWC - LPVCWD	Groundwater	8”	Zone 1	800	Active
Rowland Water District Azusa Way & Hurley St.	RWD - LPVCWD	Surface Water	8”	Zone 2	700	Emergency
City of Industry Waterworks System San Jose Ave. & Holguin Place	CIWS - LPVCWD	Groundwater	4”	Zone 5	500	Active
City of Industry Waterworks System San Jose Ave. & Holguin Place	CIWS - LPVCWD	Groundwater	12”	Zone 2	1,600	Active
City of Industry Waterworks System Industry Hills-Pump Stat. 1 (Hill St.)	LPVCWD - CIWS	Groundwater	12”	Zone 1	1,600	Emergency
City of Industry Waterworks System Ind. Hills-Pump Stat. 3 (Industry Hills Pkwy.)	CIWS - LPVCWD & LPVCWD - CIWS	Groundwater	10”	Zone 2	1,600	Active
City of Industry Waterworks System Valley Blvd. & Proctor Ave.	CIWS- LPVCWD & LPVCWD - CIWS	Groundwater	14”	Zone 1	1,600	Active
City of Industry Waterworks System Pleasanthome Drive & Industry Hills Reservoir	CIWS - LPVCWD & LPVCWD - CIWS	Groundwater	8”	Zone 3	1,600	Active

3.3 Water Reliability, Sustainability, Availability

The reliability, sustainability and availability of LPVCWD's water is directly dependent upon a wide network of sources.

When LPVCWD requires more water than its annual production rights, they are able to pump over the established water rights by leasing water rights from other stakeholders with the notice to the MSGB Watermaster. Also, the deficit water can be purchased from imported water. If LPVCWD pumped over the established water rights without leasing or purchasing from other water sources, then it will be charged through the assessment invoice from the MSGB Watermaster and that fee will be used to fill up the deficit of water from imported water sources.

In 2013-14, MWD doubled its annual conservation and outreach budget from $20M to $40M and called on its retail water agencies to implement "extraordinary conservation measures" to reduce water demand. In the 2013-14 fiscal year, the region saved about 923,000 AF of water.[4] MWD also actively supports multiple recycling and groundwater recovery programs to balance the region's water portfolio.

From 2011 to 2014, each year has been dryer than the previous year.

In 2013-14, the MSGB Watermaster set new OSY levels to help encourage conservation and continued to make progress towards building regional water supply independence as follows:

- Established a Reliability Storage Program with a target reserve of 100,000 acre-feet
- Implemented a new Water Resource Development Assessment to pay for the Reliability Storage Program
- Paved the way for importing Colorado River water into the Basin, providing additional supplies
- Set new OSY levels that will help encourage water conservation
- Expanded outreach efforts to improve consumer conservation
- Continue to make progress on groundwater cleanup and water quality protection project

LPVCWD acquired services from Montgomery Watson Harza Americas, Inc. (MWH) to produce a recycled water feasibility study that was completed in May 2011. LPVCWD's potable groundwater sources currently pump over its annual allotment by approximately 40%, thereby requiring them to pay replenishment fees to the MSGB Watermaster. A total of 74 reuse sites with a demand of 375 AFY in and adjacent to its service area within the City of Industry were identified. The feasibility study identified four (4) Alternatives for providing recycled water to LPVCWD's service area. Of the 4 alternatives, Alternative 2 (Pumped System) was the recommended recycled

[4] http://www.mwdh2o.com/PDF_About_Your_Water/2.1.1_Regional_Progress_ReportSB60.pdf

water system design. The recommended design utilizes the City of Industry's 36-inch recycled water transmission line as the source of supply for the system. This alternative includes tapping into the 36" transmission line along the San Jose Creek Channel at Parriot Place that could serve approximately 280 AFY to identified customers through a new pump station.

The construction of a recycled water system will require the District, for the first time in several decades, to obtain a loan to finance such a project. The investment in a recycled water system will deliver recycled water to several irrigation customers and replace the use of drinking water for irrigation. The current drought has made it clear that reliance on imported water for groundwater replenishment is not the best long-term solution for the regions' water supply needs. By incorporating recycled water into the District's overall supply, the District would reduce its dependence on this expensive water source.

The District has partnered with Upper San Gabriel Valley Municipal Water District to secure a $428,000 grant from the State Department of Water Resources for Phase 1 of the Recycled Water System Project. This grant will cover approximately 25 percent of the estimated cost of Phase 1, which is expected to serve 50 acre feet of recycled water per year to irrigation customers on Don Julian Avenue. Phases 2 and 3 are planned to deliver an additional 140 acre feet per year. The current cost to produce 190 acre feet of water that is over the District's annual production right is approximately $170,000. The overall cost of all 3 Phases is estimated at $7.5 million. The District is pursuing low interest loans and any available grant funding to fund this project that would otherwise not be cost effective. This new drought resistant source of water improves long-term water supply reliability for all the District's customers. For purposes of the 10-year Capital Improvement Program (CIP) budgeting allocations (Chapter 9 – Table 9-21), Phase 1 will be the only Phase included on the list of Capital Projects. Phase 2 and Phase 3 will be reviewed and analyzed further by LPVCWD staff to determine the feasibility of constructing during the next 10 years.

3.4 Supply to Pressure Zones

LPVCWD maintains five separate pressure zones as shown in **Figure 3-3**. **Table 3-2** below summarizes the basic features of the five zones.

Table 3-2 – Ground Elevation Range of Pressure Zones

Zone	Elevation (ft AMSL)	
	Low	High
1	307	442
2	378	541
3	536	690
4	453	630
5	557	568

In 2015, four zones were partially serviced with water purchased from outside LPVCWD. **Table 3-3** below list the source, size, capacity, and status for each respective zone.

Table 3-3 – Zones Capacity

Zone	Source(s)[5]	Size (inch)	Capacity (gpm)	Status
1	SWS	6	700	Active
	SGVWC	8	1,200	Active
	SGVWC	8	800	Active
	CIWS	12	1,600	Emergency
	CIWS	14	1,600	Emergency
2	RWD	10	700	Emergency
	CIWS	10	1,600	Emergency
	CIWS	12	1,600	Active
3	CIWS	10	1,600	Active
5	CIWS	4	500	Active

Based on system theory, supply to a pressure zone is defined as Q_{in}. For purposes of analysis, supply as Q_{in} is considered as the sum of all non-emergency sources entering a pressure zone, including Wells, treatment facilities, booster stations, and control valves. We will evaluate the capacity of current supply to each pressure zone against design criteria under existing and near-term demand conditions. Accordingly, each element of the water supply, storage, production, interconnection and distribution systems will be evaluated for necessary improvements to address deficiencies under the current and near-term conditions in Chapter 9.

[5] SWS – Suburban Water Systems
SGVWC – San Gabriel Valley Water Company
CIWS – City of Industry Water System
RWD – Rowland Water District

Figure 3-3 – Boundary of Pressure Zones in LPVCWD

CHAPTER FOUR- WATER QUALITY

4.1 General Description

Chapter 4 details the status and potential impacts of water quality on the LPVCWD.

The United States Environmental Protection Agency (EPA) and the Division of Drinking Water (DDW) are the public agencies responsible for drafting and implementing regulations that ensure drinking water is safe to consume. EPA and DDW establish drinking water standards that limit contaminant concentrations in water provided to the public.

LPVCWD regularly tests its drinking water using approved methods to ensure its safety. Over 100 compounds are monitored in LPVCWD's water supply and detected constituents are reported accordingly. In 2015, all water delivered by LPVCWD met or surpassed State and Federal drinking water standards.

In addition, the MSGB Watermaster, who manages the groundwater basin where LPVCWD extracts its supply, continuously and vigilantly reviews upcoming State and Federal drinking water regulations. MSGB Watermaster has been proactive in the monitoring of unregulated emerging contaminants in anticipation of new water quality standards.

4.2 Consumer Confidence Report

Water utilities in California have been required to provide an annual report to their customers since 1991, which summarizes the prior year's water quality and explains important issues regarding their drinking water. In 1996, the United States Congress reauthorized the Safe Drinking Water Act (SDWA), which was originally passed in 1974 and later amended in 1986. The 1996 reauthorization called for the enhancement of nation-wide drinking water regulations to include important components such as source water protection and public information. The LPVCWD 2015 Water Quality/Consumer Confidence Report was prepared in compliance with the consumer right-to-know regulations required by the SDWA 1996 amendments and is provided in **Appendix C**.

4.3 Safe Drinking Water Act

The federal government, with the passage of the Safe Drinking Water Act (U.S. Congress, 1974) through the EPA, was given the authority to set drinking water quality standards for all drinking water delivered by community (public and/or private) water suppliers. The SDWA requires two types of standards: primary and secondary. Primary standards are enforceable and intended to protect public health, to the extent feasible, using technology, treatment techniques, and other means, which the EPA determines are generally available on the date of the enactment of the SDWA. Primary standards include performance requirements (Maximum Contaminant Levels, or MCL's) and/or treatment requirements. The SDWA also contains provisions for secondary drinking water standards for MCLs on contaminants that may adversely affect odor or appearance of water. Secondary standards are not enforceable.

The SWDA has established processes for identifying and regulating drinking water contaminants to protect human health. The Candidate Contaminant List and the Unregulated Contaminant Monitoring Rule are scientifically rigorous processes for determining the appropriate status of currently unregulated contaminants. Regulations regarding these processes were enacted by amendment to the SDWA in 1996 to address emerging constituents.

4.4 Current and Pending Water Quality Related Legislation

Changes to water quality regulations and standards and the review of legislation is closely monitored by numerous stakeholders including EPA, DDW and AWWA. The following sections provide a summary of pressing issues cited by these agencies that may impact LPVCWD.

4.4.1 Hexavalent Chromium

Hexavalent chromium, also known as chromium 6, is the subject of significant developments at the state and federal levels. Though there are currently no existing or proposed drinking water standard specifically targeting chromium 6, the California Office of Environmental Health Hazard Assessment has proposed a public health goal of 0.02 parts per billion (20 parts per trillion) in July 2011. DDW proposed an MCL for chromium 6 of 0.010 milligram per liter (10µg/L) and announced the availability of the proposed MCL for public comment. DDW reviewed the comments submitted by interested parties and responded to them in the final statement of reasons. On April 15, 2014, DDW submitted the hexavalent chromium MCL regulations package to the Office of Administrative Law (OAL) for its review for compliance with the Administrative Procedure Act. On May 28, OAL approved the regulations, which were effective on July, 2014. The EPA and members of Congress have signaled their intent to focus on chromium 6 in drinking water. It should be noted that chromium 6 is currently indirectly monitored under the total chromium MCL of 50µg/L at the state level and 100µg /L at the federal level.

4.4.2 Impacts of Climate Change

Climate change has the potential to affect the reliability of both local and imported water supplies, and adds its own uncertainties to the challenges of planning. Climate change could also increase water demand. For example, studies conducted by the National Center for Atmospheric Research for Inland Empire Utilities Agency, suggest a 0.21 to 3.81 degrees F temperature increase and -19 to +8 percent change in winter precipitation in Southern California between 2000 and 2030 (Groves, Knopman, Lempert, Berry, & Waifan, 2008). Studies conducted by the Southern California Association of Governments (SCAG) suggest that current temperatures will increase by 1 to 2 degrees F by 2050, and by 4 degrees F above current levels by 2100 (Governments, 2009). Higher temperatures and reduced precipitation are expected to increase evapotranspiration and irrigation water demands; however, higher temperature may also result in increased humidity which could offset a portion of the demand increase. Reliability estimates developed by the California Department of Water Resources (DWR) for the State Water Project (SWP) supplies account for the impacts of climate change.

Traditional planning methods assume that future hydrologic conditions will be representative of past conditions (from early 1900s). However, as demonstrated by current weather patterns, future climate and hydrologic conditions may differ from past observations due to climate change and extremities of climate variation that have recently manifested. In addition to climate change and natural variation, other uncertainties such as population projections and unforeseen regulatory changes, may pose risks to resource management strategies that assume the status quo.

It is important to make a distinction between climate and weather. Climate is how the atmosphere behaves in an area over a long period of time, while weather is the state of the atmosphere over a short period of time.

Climate change was once considered an issue for a distant future but now has moved into the present. It can be defined as a change in global or regional climate patterns primarily due to human-induced emissions of heat-trapping gases.

According to the 2014 National Climate Assessment (NCA), "climate change is already affecting American people in far-reaching ways. Certain types of extreme weather events have become more frequent and/or intense, including prolonged periods of heat, heavy downpours, and, in some regions, floods and droughts. In addition, warming is causing sea level to rise and glaciers and Arctic sea ice to melt, and oceans are becoming more acidic as they absorb carbon dioxide".[1]

Climate change is expected to affect California's water supply conditions, with one of the most significant impacts being reduction in mountain snowpack due to warmer temperatures that will likely increase evapotranspiration rates and extend growing seasons.

Per the 2010 California Drought Contingency Plan[2], regions that rely heavily upon surface water or surface water recharge could be particularly affected as runoff and surface water supply becomes more variable, and more demand is placed on groundwater and availability for surface water for groundwater recharge is limited. Climate change and a projected increase in California's population will also affect water demand. Southern California entered a drought state in 2012 throughout 2016.

The impact of climate change on LPVCWD is unknown at this time, but it may cause a decrease in available supplies and an increase in demand. It is recommended to maintain a dialogue with local jurisdictions, the County of Los Angeles and the State of California on the subject of climate change regulation.

4.4.3 Electronic Dissemination of Consumer Confidence Reports (CCR)

SDWA requires public drinking water system administrators to electronically post water quality reports to all customers on an annual basis. The US Senate enacted the "End Unnecessary Costs Caused by Report Mailing Act of 2011" (S.1578, HR.1340) intended to increase the efficiency of required correspondence by utilizing modern communications technology. As a result, LPVCWD utilizes electronic communication of water quality reports. California water purveyors are currently able to electronically submit the CCR as of 2013.

[1] "Highlights". Climate Change Impacts in the United States. U.S. National Climate Assessment.
[2] California Drought Contingency Plan 2010. California Department of Water Resources.

4.4.4 "Safe Harbor" for MTBE

The US House of Representative is considering the "Domestic Fuels Protection Act" (HR.4345) whose provisions would allow polluters to pass on to communities and their customers the cost of cleaning up drinking water sources contaminated by MTBE (methel tertiary-butyl ether). This issue of "safe harbor" for contamination by MTBE came up previously, and the House and Senate ultimately did not include such provisions in the comprehensive energy bill enacted in 2005.

If MTBE is present in LPVCWD groundwater, LPVCWD may become responsible for its cleanup. It is recommended LPVCWD monitor legislation regarding the issue regarding MTBE cleanup.

4.4.5 EDCs and Pharmaceuticals

There are increasing concerns over the detection of endocrine-disrupting compounds (EDCs) and other pharmaceuticals in water. Per AWWA, both non-point source runoff and sewage effluent from properly operated waste treatment plants may contain minute traces of these compounds. Some minute quantities of these products will pass through animals and humans who use them, and enter the waste stream. They are typically not completely destroyed or removed by wastewater treatment processes. The concern does not stem from the detected concentrations of these compounds, but from their mere existence. As detection instruments become more and more sensitive, extremely low concentrations of constituents in water can be detected. Modern devices are now able to detect compounds at the parts-per-trillion level, and are breaching the parts-per-quadrillion boundary in some cases. To date, however, no concentrations of EDCs or pharmaceuticals have been detected which pose a health risk. Research is ongoing.

The impact on LPVCWD is unknown at this time. It is recommended LPVCWD monitor legislation regarding potential development of MCLs for EDCs.

4.4.6 Groundwater Replenishment Reuse

DDW has proposed updated regulations for groundwater replenishment with recycled municipal wastewater (See **Appendix B**). These regulations would provide guidance, standards and requirements for the implementation of a Groundwater Replenishment Reuse Project (GRRP). A GRRP sponsor would be responsible for demonstrating project feasibility, compliance and monitoring.

These regulations may impact the conclusions of the feasibility study being undertaken by Upper San Gabriel Valley Municipal Water District (USGVMWD) regarding its Indirect Reuse Groundwater Replenishment Project, per U.S. Dept. of the Interior:

> The USGVMWD will investigate and seek solutions to reverse diminishing groundwater supplies in the main San Gabriel Basin. The objective is to offset current interruptible imported supplies with 10,000 to 20,000 acre-feet annually of locally supplied recycled water within the next 8 to 13 years. The feasibility study will evaluate multiple sources of reclaimed water and compare these alternatives

against a "no project" alternative in order to determine the best method for replenishment for the study area.

LPVCWD may have an opportunity to participate as member agency in the USGVMWD project, depending on the outcome of the study.

MWD under partnership with the Sanitation Districts of Los Angeles is also currently exploring the potential of a water purification project to reuse water currently discharged to the Pacific Ocean for recharge of regional groundwater basins in Los Angeles and Orange counties. MWD would construct a new purification plant and distribution lines to groundwater basins. The operational phases of the project could call for deliveries of up to 150 MGD of purified water and the construction of about 60 miles of distribution lines to convey the water to spreading basins and/or injection Well sites in both of the counties. [3] This project would be the first in-region production of water by MWD and may beneficially impact LPVCWD supply with recharge extending to the Main San Gabriel Basin.

4.5 Local Contamination

In 1991, the levels of volatile organic compounds (VOCs) in the LPVCWD Wellfield began to exceed the maximum contamination levels set by the DDW. In 1997, several new chemicals not previously identified as concern (including perchlorate, NDMA, and 1,4-dioxane) were discovered in the District's Wellfield. These contaminants are treated through the La Puente Treatment Plant. The summary of water quality data for Well 2, 3 and 5 is described in **Table 4-2**.

The concentration trend (2012 to 2016) of these contaminants in the raw water (Well Nos. 2, 3 and 5) is described in **Table 4-1**.

Table 4-1 – Trend of Water Quality

Contaminants	Well 2	Well 3	Well 5
TCE	Decreasing	Decreasing	Decreasing
PCE	Constant	Decreasing	Decreasing
CTC	Decreasing	Decreasing	Decreasing
1,2 DCA	Constant	Decreasing	Decreasing
Perchlorate	Constant	Decreasing	Constant
Nitrate	Increasing	Increasing	Constant
NDMA	Constant	Decreasing	Decreasing
1,4 Dioxane	Increasing	Decreasing	Decreasing

[3] The Metropolitan Water District of Southern California, Regional Recycled Water Program

The average raw water contaminant concentration levels in 2015-2016 with their respective MCL/NL for Wells No. 2, No. 3, and No. 5 are listed in **Table 4-2**.

Table 4-2 – Average Water Quality and MCL/NL

Contaminants	Well 2	Well 3	Well 5	MCL/NL
TCE	55.5 ug/l	0.82 ug/l	13.7 ug/l	5 µg/L
PCE	3.3 ug/l	ND	1.1 ug/l	5 µg/L
CTC	2.7 ug/l	ND	0.5 ug/l	0.5 µg/L
1,2 DCA	2 ug/l	ND	0.4 ug/l	0.5 µg/L
Perchlorate	39 ug/l	7.9 ug/l	15.9 ug/l	6 µg/L
Nitrate (As Nitorgen)	6.7 mg/l	8.1 mg/l	6.5 mg/l	10 mg/L
NDMA	91.7 ng/l	ND	26.4 ug/l	*10 µg/L
1,4 Dioxane	1.6 ug/l	ND	0.2 ug/l	*1 µg/L

ND = Non Detect
MCL = Maximum Contaminant Level
* Notification Level (NL)

4.6 Current Water Treatment

The La Puente Treatment Plant, located at 1695 Puente Avenue in the City of Baldwin Park, was completed in February of 2000. This treatment facility includes the following elements to treat groundwater from Wells No. 2, No. 3, and No. 5:

- Two parallel air stripping towers with off-gas carbon for treating VOCs.
- An ion exchange (4 vessels) for treating perchlorate.
- A hydrogen peroxide injection system and two Ultraviolet light/oxidation systems in parralel for treating NDMA and 1,4- dioxane.
- Two booster pump stations.

The layout and flow diagram of La Puente Treatment Plant is shown in **Figure 4-1** and **Figure 4-2**.

After treatment, the water is piped to the District's Hudson Booster Station located in the City of La Puente and pumped into the District's water system. The water is closely monitored and tested to assure that the water delivered to the public complies with all Federal and State drinking water regulations. The Treatment Plant current capacity is 2,500 gallons per minute, meeting 100% of the District's water needs.

4.7 Puente Valley Operable Unit Intermediate Zone Project

The District prides itself on its efforts over the past 25 years to provide groundwater cleanup (treatment) in the Main San Gabriel Groundwater Basin. In fact, the District was the first water agency in the San Gabriel Valley to provide multi-barrier treatment for various contaminants at its groundwater treatment facility, which kick started other groundwater treatment projects in the Valley. Over the years, the District's groundwater treatment plant has removed tons of contaminants. Our District's overall goal is to leave the groundwater basin free of contamination for future generations, so that it may continue to be used to meet the needs of its residents.

In mid-2014, the District was presented with an opportunity to further make a difference in remediating groundwater contamination in the Main San Gabriel Basin, more specifically the Puente Valley area. Under an order by US EPA, several industrial companies have been planning for several years to construct a highly efficient groundwater treatment system. This system would be comprised of 50 monitoring Wells, 7 production Wells, and multiple treatment technologies. In 2015, a property was purchased, by the lead industrial company, to construct the groundwater treatment facility. This property is located within the District's service area and in close proximity to the District's water distribution facilities. Since District staff already has experience operating a similar groundwater treatment system, the District has agreed to operate the Puente Valley Operable Unit Intermediate Zone (PVOU IZ) treatment facility. The District will receive fully treated water, which meets all State and Federal drinking water standards, into its water system and will utilize this water as a back-up supply for the District and for neighboring water purveyors.

In November 2014, the District and the lead industrial company signed a Term Sheet to move forward with plans for the District to operate and deliver water from the proposed groundwater treatment plant. The plant will need to be operated on a continual basis and any surplus water in excess of the needs of the District will be conveyed to another neighboring Water Agency. The plant will improve water quality in the groundwater basin, provide an additional emergency water supply for the community of La Puente, and create an additional revenue source for the District. The groundwater treatment system and associated improvements are anticipated to be constructed over the next two to three years with groundwater treatment starting in 2019/2020.

Figure 4-1 - Layout of LPVCWD Water Treatment Facility

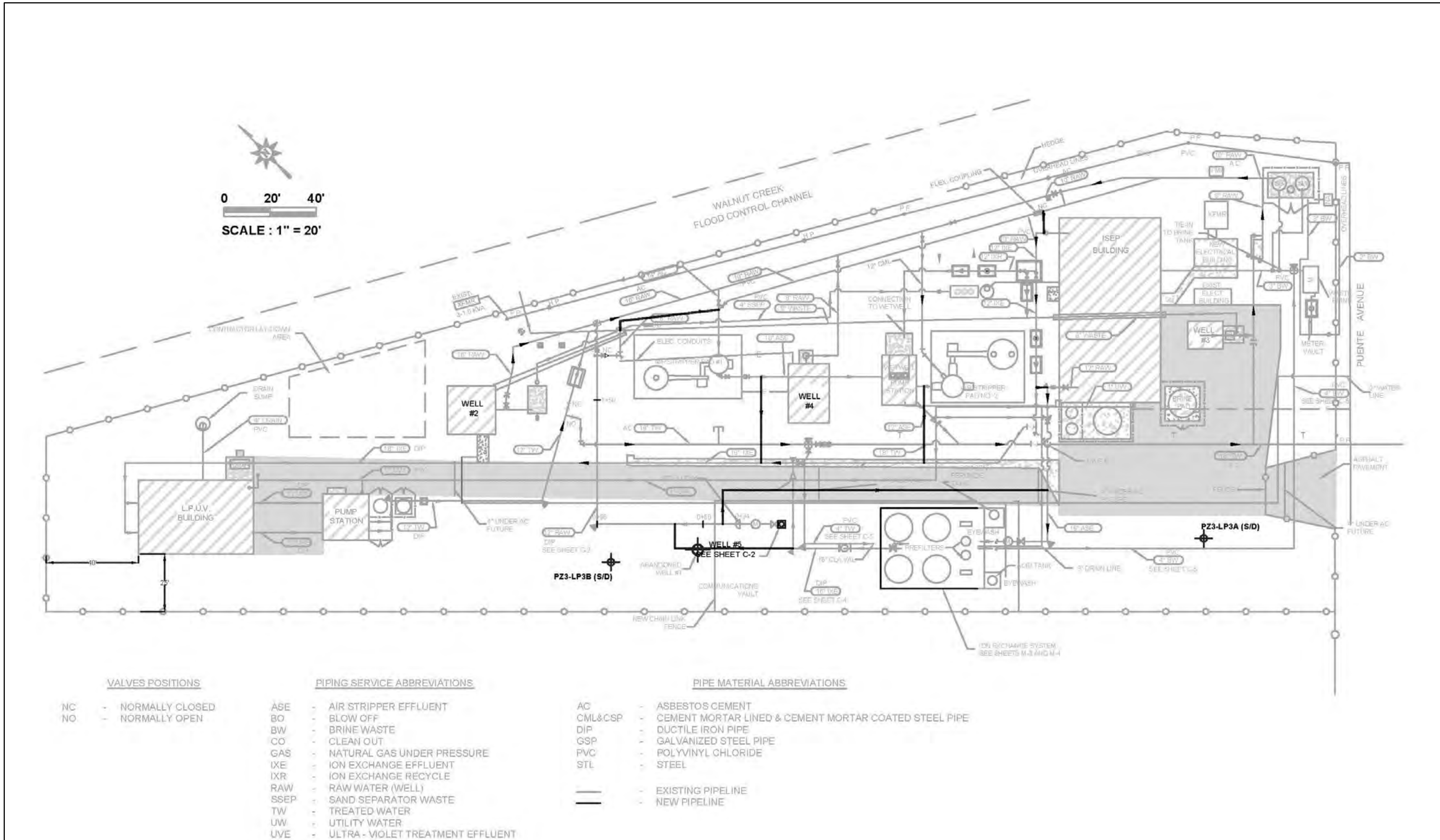
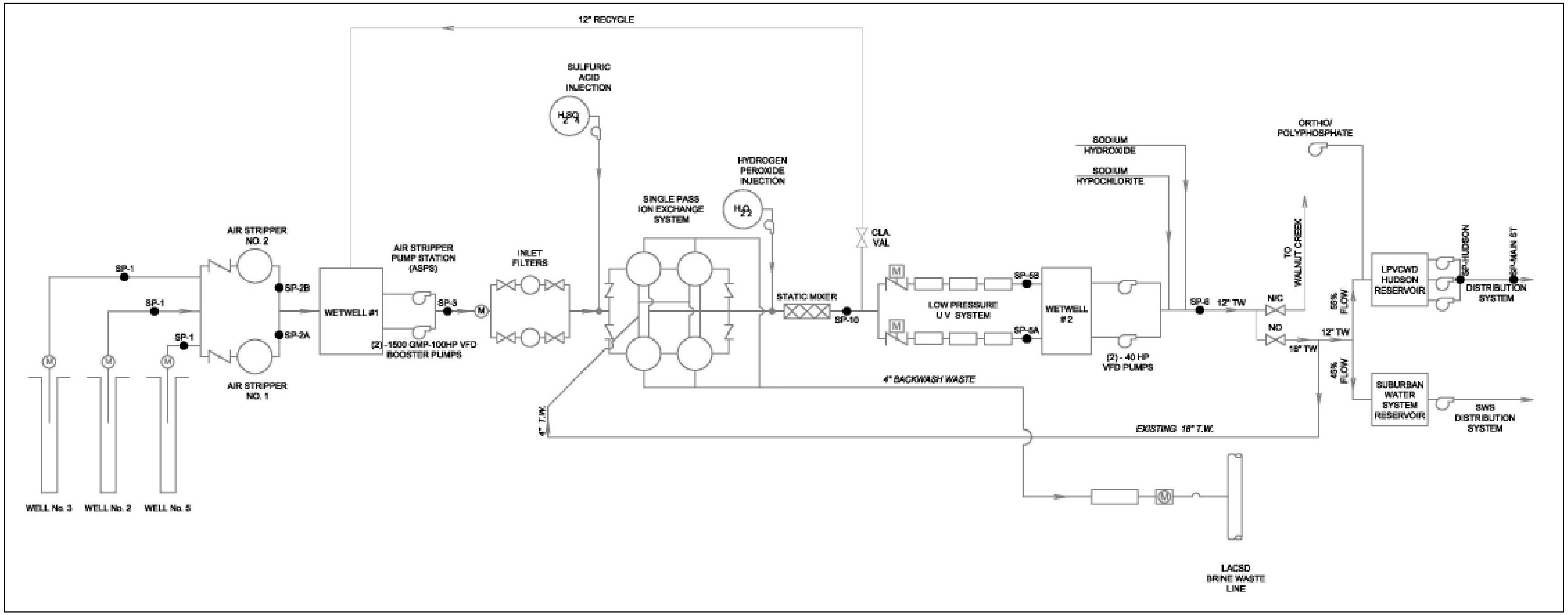


Figure 4-2 – Flow Diagram of LPVCWD Water Treatment Facility



CHAPTER FIVE - EXISTING WATER SYSTEM

5.1 General Description

LPVCWD was founded in 1924. LPVCWD's primary source of water supply comes from the Main San Gabriel Groundwater Basin. Once extracted, water is treated through LPVCWD's Treatment Plant and then conveyed to the Hudson Reservoir in Zone 1 of LPVCWD distribution system. In total, LPVCWD operates five interconnected pressure zones were 96% of customers are located in Zones 1 and 2. Booster Stations are located within the system to lift water to Zones 2, 3, 4, and the Industry Hills Reservoirs. Zone 5 and Zone 3 are both serviced by the Industry Hills Reservoirs, which also provide emergency supply for Zone 2.

LPVCWD's system includes approximately 2,500 service connections, 34.2 miles of distribution and transmission mains, 3 active Wells, 6 booster pump stations, and 3 reservoirs. Most of LPVCWD's infrastructure was constructed in the 1950's and 60's.

5.2 Supply System Facilities

The supply system for LPVCWD consists of groundwater Wells and emergency intertie connections. Under normal operating conditions, all supply is provided by groundwater.

5.2.1 Groundwater Wells

LPVCWD owns three active Wells (2, 3 & 5), one abandoned/destroyed Well (1) and two inactive Wells (4 and Orange). Wells 2, 3 and 5 are located at LPVCWD's Well field at 1695 Puente Avenue in Baldwin Park. Currently, only Wells 2, 3 and 5 are operational. The area of the groundwater basin in which Wells draw their water from is contaminated. A treatment plant was installed to treat contaminated groundwater to potable water standards as required by the DDW. Details of the active LPVCWD Wells are shown in **Table 5-1**. Under normal operation, Well No. 5 supplies all the source water to the treatment facility.

Table 5-1 – LPVCWD Active Wells

Well Designation	Year Installed	SCE Eff. Test	Capacity (gpm)	Total Head (ft)	Depth (ft)	Casing Dia (in)	Energy Source	Status
No. 2	1976[1]	Yes	1,606	215	947	16	Electric	Active
No. 3	1989[2]	Yes	1,101	203	800	16	Electric	Active
No. 5	2008	Yes	2,286	247	785	20	Electric	Active

In addition, details on two inactive Wells and one abandoned Well are shown in **Table 5-2**.

[1] Well No. 2 was originally drilled in 1926 and re-drilled in 1976

[2] Well No. 3 was originally drilled in 1962 and re-drilled in 1989

Table 5-2 – LPVCWD Inactive Wells

Well Designation	Year Installed	Capacity (gpm)	Depth (ft)	Casing Dia (in)	Energy Source	Status
No. 1	1925	NA	200	NA	NA	Abandoned
No. 4	1973	1,000	743	16	Natural Gas	Inactive
Orange			232			Inactive

5.2.2 Emergency Interconnections

LPVCWD has nine (9) emergency interconnections with its neighboring agencies. **Table 5-3** below shows the summary of these connections.

Table 5-3 – Emergency Interconnection Summary

Connection	Source	Zone Served	Size (in)	Capacity (gpm)
Suburban Water Systems Azusa Way & Hurley St.	SWS	LP Zone 2	6	500
Suburban Water Systems N. Hacienda Blvd. & Loukelton St.	SWS	LP Zone 1	6	700
City of Industry Waterworks System* San Jose Ave. & Holguin Place	CIWS	LP Zone 2	12	1,600
City of Industry Waterworks System* San Jose Ave. & Holguin Place	CIWS	LP Zone 5	4	500
City of Industry Waterworks System* Industry Hills-Pump Stat. 1 (Hill St.)	CIWS	LP Zone 1	12	1,600
City of Industry Waterworks System* Ind. Hills-Pump Stat. 3 (Industry Hills Pkwy.)	CIWS	LP Zone 2	10	1,600
City of Industry Waterworks System* Valley Blvd. & Proctor Ave.	CIWS	LP Zone 1	14	1,600
Rowland Water District Azusa Way & Hurley St.	RWD	LP Zone 2	8	700
San Gabriel Valley Water Co. Don Julian Rd. & Turnbull Canyon Rd.	SGVWC	LP Zone 1	8	1,200
San Gabriel Valley Water Co. Proctor Ave. & El Encanto	SGVWC	LP Zone 1	8	800

*Denotes Emergency Interconnection

5.3 Booster Stations

The LPVCWD has six (6) booster pumping stations within its District. Each one has between two (2) or three (3) booster pumps with varying horse-powers, design flows, and design heads.

Table 5-4 contains the summary of each booster pump in accordance to its booster pump station. If the pump had a recent SCE efficiency test, those results are shown below.

Table 5-4 – Booster Station Pump Data

Booster Station	Booster Pump Designation	Suction Zone	Discharge Zone	Horse Power	SCE Eff. Test/ Year	Capacity (gpm)	Total Head (ft)	Design Flow (gpm)	Design Head (ft)
Hudson Booster Station	Booster 1	Hudson Tank	PZ 1	75	Yes/ 2014	1,170	164.4	1,700	142
	Booster 2	Hudson Tank	PZ 1	75	Yes/ 2014	980	160	1,700	142
	Booster 3	Hudson Tank	PZ 1	75	N/A	---	---	1,700	142
Pressure Zone 2 (PZ 2)	Booster 1*	PZ 1	PZ 2	50	Yes/ 2013	725	154	700	231
	Booster 2	PZ 1	PZ 2	150	No/ 2013	1,290 (Z4) 1,620 (Z2)	305.4 (Z4) 240.7 (Z2)	1,556	277
	Booster 3*	PZ 1	PZ 2	60	Yes/ 2013	850	186.7	890	208
Pressure Zone 3 (PZ 3)	Booster 1	PZ 2	Industry Hills Tanks	10	Yes/ 2013	200	127	270	127
	Booster 2	PZ 2	Industry Hills Tanks	40	Yes/ 2013	620	131	680	133
Sub-Pressure Zone 3 (Sub PZ 3)	Booster 1*	PZ 3	Sub PZ 3	1.5	N/A	---	---	90	360
	Booster 2*	PZ 3	Sub PZ 3	1.5	N/A	---	---	90	360
Pressure Zone 4 (PZ 4)	Booster 1*	PZ 1	PZ 4	15	N/A	---	---	111	273
	Booster 2*	PZ 1	PZ 4	15	N/A	---	---	111	273
La Puente Treatment Plant	Booster 1*	LPUV Wetwell	Hudson Tank	40	Yes/ 2014	650	62	1,500	70
	Booster 2*	LPUV Wetwell	Hudson Tank	40	Yes/ 2014	735	60	1,500	70

* under the Booster Pump Designation column on **Table 5-4 indicates** VFD (variable frequency drive) controlled. VFD controlled pumps minimize pressure fluctuation and match the supply to demand. The other booster pumps are fixed speed pumps.

5.4 Control Valves

Within the LPVCWD system, there are seven (7) control valves – three pressure relief valves and four pressure reducing valves: one (1) LP Pressure Zone 4 pressure relief valve, one (1) LP Pressure Zone 2 pressure relief valve, one (1) pressure zone 3 relief valve, one (1) LP Pressure Zone 5 pressure reducing valve, one (1) LP Zone 1 pressure reducing valve, and two (2) LP Pressure Zone 2 pressure reducing valve.

The LP Zone 4 pressure relief valve maintains discharge pressure from LP's Pressure Zone 4 by relieving excess flow back to La Puente's Pressure Zone 1. This control valve is programmed to be normally closed unless the upstream pressure reaches above 125 psi.

The LP Zone 2 pressure relief valve maintains discharge pressure from LP's Pressure Zone 2 by relieving excess flow back to La Puente's Pressure Zone 1. This control valve is programmed to be normally closed unless the upstream pressure reaches above 95 psi.

The LP Pressure Zone 3 pressure relief valve maintains a consistent pressure in Zone 3 when the Zone 3 pump station is operated and feed from the Industry Hills Reservoirs is interrupted.

The LP Pressure Zone 5 pressure reducing valve help maintain a minimum pressure in LP Zone 5 by allowing water from the Industry Hills tank to flow into Zone 5. This control valve is programmed to be active with the set point of 66 psi.

The LP Zone 1 pressure reducing valve maintains a minimum pressure in LP Zone 1 by allowing water from the industry public utilities to flow into Zone 1.

The LP Pressure Zone 2 pressure reducing valves help maintain a minimum pressure in LP Zone 2 by allowing water from the Industry Hills tank to flow into Zone 2. This control valve is programmed to be normally closed unless the downstream pressure reaches below 44 psi.

5.5 Reservoirs

Zone 2 and 4 of the distribution system are supplied by the 3 million gallon and 1.8 million gallon reservoirs located on Main Street. The 3-million-gallon steel tank was relined and repainted in 2009. The 1.8-million-gallon steel tank was constructed in 2005. The 100,000-gallon concrete Hudson Reservoir is a transfer station from the treatment facility to Zone 1, which was reconstructed in 2000. With the completion of the relining and repainting of the 3-million-gallon tank, LPVCWD's water storage facilities are all currently in good condition.

Table 5-5 below shows the summary of the reservoirs within LPVCWD.

Table 5-5 – Reservoir Summary

Reservoirs	Base Elevation (ft)	Overflow Elevation (ft)	Depth (ft)	Geometry	Capacity (MG)
Hudson	321	335	16	Rectangle	0.1
Main Street No.1	450	488	40	Circular	3.0
Main Street No.2	450	488	40	Circular	1.8

5.6 Distribution System

The Distribution system for LPVCWD consists of transmission pipelines and distribution pipelines. Transmission pipelines are intended to efficiently carry large volumes of water between facilities while distribution pipelines carry water to LPVCWD's users and fire hydrants within each pressure zone accordingly.

5.6.1 Pipelines

LPVCWD's water system has approximately 34.2 miles of water pipeline, ranging in size from 2 inch to 18 inch. According to the Water Model database, there is about 180,619 feet (34.2 miles) within LPVCWD system and about 70,488 feet (13.4 miles) of pipelines are between 10 inches and 18 inches. Asbestos cement is the most common pipeline material within the system. LPVCWD's system also has pipelines of cement mortar lined and coated steel, polyvinyl chloride (PVC), and ductile iron. Asbestos cement pipe is no longer readily available due to environmental hazards associated with manufacturing and installation. When pipeline replacement within the system is needed, the asbestos cement pipe is replaced with PVC or ductile iron pipe

Table 5-6 shows the breakdown of existing pipelines by diameter and material of pipelines.

Table 5-6 – Pipeline Summary

Size (in)	ACP	CIP	DIP	PVC	STL	STEEL CML&C	Totals
2	44	742	-	90	514	-	1,390
4	14,339	-	37	729	1,352	-	16,457
6	46,998	-	815	3,390	184	32	51,419
8	38,376	-	740	914	731	85	40,846
10	3,968	-	2,203	231	-	37	6,439
12	19,323	1,020	1,824	-	43	2,149	24,359
14	9,562	93	-	-	-	-	9,655
16	20,070	-	-	-	364	-	20,434
18	1,835	-	7,416	-	350	-	9,601
	154,515	1,855	13,035	5,354	3,538	2,303	180,600

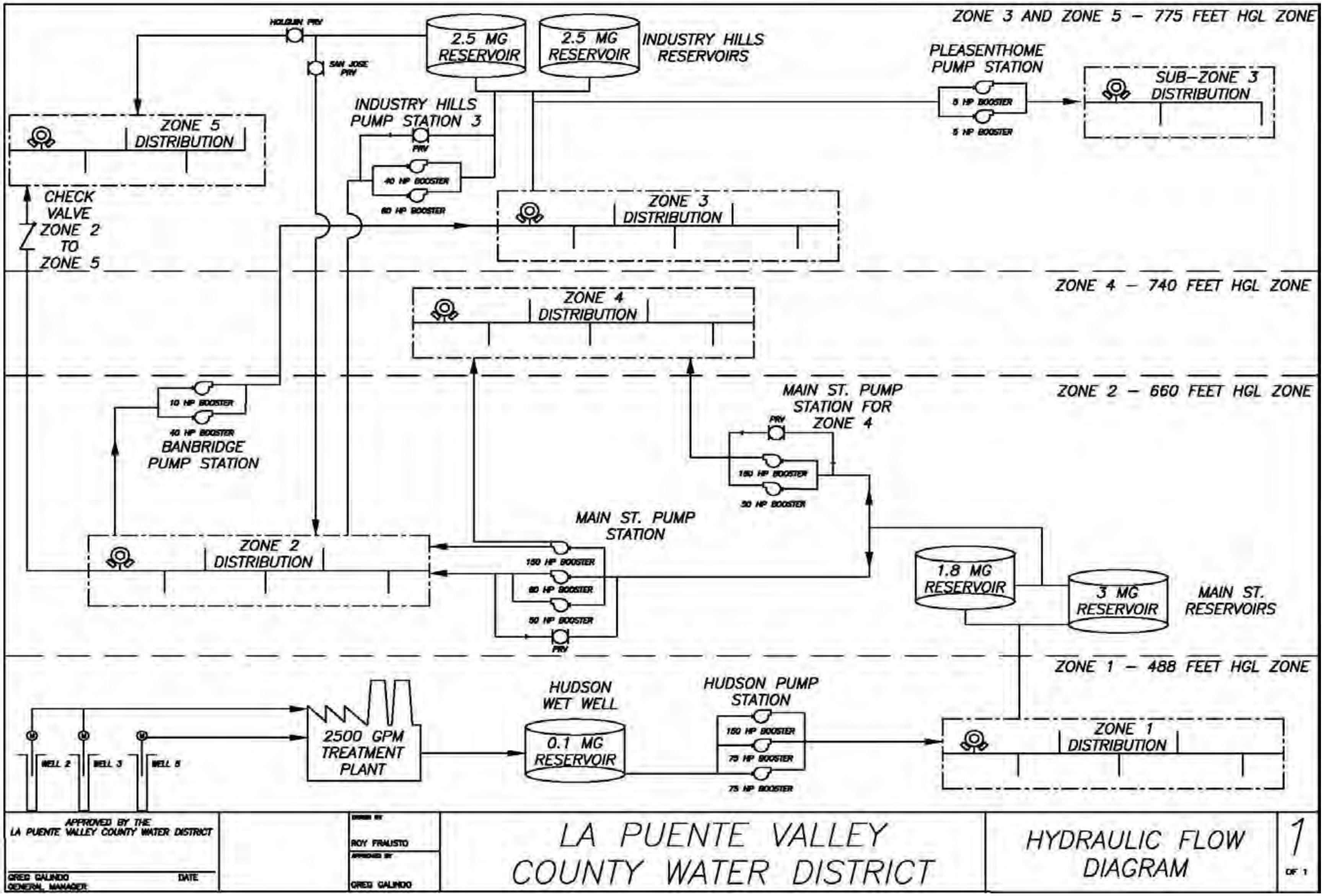
5.6.2 Pressure Zones

Currently, there are five pressure zones in the District's distribution system. **Figure 5-1** contains a map of the District's system showing each Pressure Zone accordingly and **Figure 5-2** shows the hydraulic flow diagram for the District'system.

- Pressure Zone 1 is served by the Hudson Booster Station and the Main Street Reservoir.
- Pressure Zone 2 is served by the Pressure Zone 2 Booster Station located at the Main Street Reservoir site and active interconnections with Industry Public Utilities.
- Pressure Zone 3 receives water from Zone 2 and Industry Hills Reservoirs. Pressure for Zone 3 is provided by a metered interconnection with the Industry Hills Reservoir. The Banbridge booster pump station supplies water directly to the Industry Hills Reservoir during off peak hours to replenish water used on a routine basis.
- Pressure Sub – Zone 3 is served the Sub-Zone 3 booster pump station which receives water from the Industry Hills Reservoir.
- Pressure Zone 4 is served by the Pressure Zone 4 Booster Station located at the Main Street Reservoir site to the west of Pressure Zone 2 Booster Station. The Pressure Zone 4 Booster Station lifts water from Pressure Zone 1 to Pressure Zone 4. Pump 2 of the Zone 2 Booster Station also provides through automatic control flow to fire requirements in Zone 4
- Pressure Zone 5 (Holguin Place) is served through a 4-inch connection from the CIWS. The ten customers on Holguin Place receive water from the Industry Hills Reservoirs through a 4-inch metered pressure reducing valve which is set to maintain 65 psi. Zone 5 can also be served from the District's Zone 2.

Figure 5-1 – Pressure Zone Map

Figure 5-2 – Hydraulic Flow Diagram



5.7 Treatment Facilities

The Treatment Facility at LPVCWD is part of a cooperative effort to remove the groundwater contaminants from the Baldwin Park Operable Unit (BPOU), a subunit of the San Gabriel Valley Superfund site. The Watermaster, the San Gabriel Basin Water Quality Authority (WQA), and the Upper District are working with the LPVCWD to restore production at the LPVCWD Well field, which is located near the southern edge of the BPOU. This project is consistent with the requirements of the United States Environmental Protection Agency (USEPA) contained in the Record of Decision (ROD) for the BPOU.

The current flow capacity of the Treatment Facility is 2,500 gallons per minute. The Treatment Facility was designed so either Well No. 2 or Well No. 3 could provide raw water for treatment. Well No. 5 was completed and equipped in 2008. Well No. 5 is now the primary source of water to the treatment facility with Wells 2 and 3 used as backup sources.

The Treatment Facility is designed to treat VOCs, perchlorate, NDMA and 1,4-dioxane. Although the Treatment Facility was designed to treat water pumped from LPVCWD's Well No. 2 and No. 3, Well No. 5 has similar perforations and water quality compared to those of Well No. 2 and No. 3. Under normal operation, LPVCWD's Well No. 5 supplies all the source water to the Treatment Facility. In the event Well No. 5 is out of service for any reason, the Treatment Facility can treat water pumped from Wells No. 2 and No. 3. All operation and maintenance and monitoring described for Well No. 5 herein shall also apply to Wells No. 2 and No. 3 when in operation.

The general process of the Treatment Facility is as follows: Groundwater pumped by Well No. 5 (Well No. 2 and/or No. 3 if used) is conveyed to the air strippers. The air strippers remove volatile organic compounds (VOCs) in excess of the Maximum Contaminant Levels (MCLs). LPVCWD constructed a 1,000 gpm air stripper to remove VOCs, including but not limited to trichloroethylene (TCE), perchloroethylene (PCE), carbon tetrachloride (CTC), 1,2-dichloroethane (1,2-DCA), 1,1-dichloroethylene (1,1-DCE), and cis-1,2-dichloroethylene, which began operating in September 1992. Due to a continuing rise in VOC concentrations, another 1,500 gpm air stripper was constructed and began operating in September 1995. Air strippers operate at atmospheric pressure, so water must be re-pressurized to pass through additional treatment.

Each air stripping tower has an off-gas control unit containing vapor-phase activated carbon which is operated under the oversight of the USEPA. Air Strippers No. 1 and No. 2 were designed to treat 1,000 gpm and 1,500 gpm of flow, respectively. As the groundwater flows over the packing in the towers, the VOCs are transferred from the water to air flowing in a countercurrent direction. The VOCs in the air are removed by the activated carbon, and the clean air is released to the atmosphere.

From the air strippers, the water flows by gravity to a Wet Well where it is pumped by two 100 hp VFD booster pumps. The water is pumped from the Wet Well into the filtration system prior to the Single Pass Ion Exchange (SPIX) treatment system.

A pre-filtration system provides filtration to the inflow water of the SPIX treatment system. The filtration system consists of two filters, with one filter operating and the other filter on standby.

Each filter unit is rated for at least 3,500 gpm of flow. A bag filter is used with a filtering size of 10 microns.

After passing through the pre-filtration system, the water is injected with sulfuric acid prior to entry into the SPIX treatment system. A pH probe located downstream of the sulfuric acid injection point sends an electronic signal to the acid pump to inject the correct amount of sulfuric acid to maintain the pH between 7.25 and 7.5.

After sulfuric acid injection, water flows through the SPIX system. The SPIX treatment system consists of two pairs of ion exchange vessels arranged in parallel. Each pair of ion exchange vessels is comprised of two vessels operating in series to form a lead-lag configuration, for a total of four vessels. The fixed bed SPIX treatment system is designed to reduce the concentration of perchlorate in the water to at least below the current DDW detection limit for purposes of reporting (DLR) of 4 µg/l.

Downstream of the SPIX system, hydrogen peroxide is injected into the flow stream. Hydrogen peroxide enhances NDMA destruction with UV radiation and is necessary for the destruction of 1,4 Dioxane in the UV reactors. The UV system also operates under atmospheric conditions. The treated water from the UV system flows to a Wet Well. Two 40 hp VFD booster pumps pump the flow from the Wet Well to the District's distribution system via the Hudson Reservoir. Just downstream of the UV Wet Well pumps, the treated water is disinfected with sodium hypochlorite and the pH is adjusted with the addition of sodium hydroxide. After disinfection, the treated water flows via a 16-inch pipeline to the Hudson Reservoir.

CHAPTER SIX– COMPUTER MODEL

6.1 General Description

The computer modeling program used to model LPVCWD's water system is the InfoWater software by Innovyze. InfoWater is a sophisticated and powerful software package that uses GIS as a visual interface. It operates under a Windows environment to perform steady state analyses of water distribution systems including pipes, pumps, reservoirs, tanks, and control valves.

6.2 Water Model Development Methodology

The water system was created by using elements and nodes to generate LPVCWD's water system. An element represents a pipe within the water system and performs as a fluid conductor. Each element is connected to two nodes to represent the beginning and end of a pipe. There are five type of nodes utilized in the program:

- Reservoir – A reservoir represents a fixed head source with an infinite volume such as an aquifer or imported water connection.
- Tank – A tank represents a variable head source with a finite volume that may fill or empty.
- Pump – A pump adds head to the system in a predetermined direction according to a performance curve of head vs. flow.
- Valve – A valve subtracts head from the system in a predetermined direction. There are multiple types of valves including pressure reducing, pressure sustaining and flow control.
- Demand Node – System demands are estimated for an area and allocated to the nearest demand node as a fixed flow.

InfoWater generates and maintains an interactive database containing static and variable data. The static data represent physical elements of the water system that remain constant over time, such as pipes, reservoirs, pumps, valves, hydrants, and other appurtenances. The variable data represent the dynamic aspects of the water system that tend to change over time, such as demand, reservoir levels, pump, and valve operations. A scenario is a predetermined combination of static and variable elements that represents a set of boundary conditions of interest to the engineer. Through an iterative process, InfoWater applies a hydraulic gradient algorithm to the boundary conditions provided in the scenario to predict the hydraulic performance of the system.

InfoWater has the option of using one of three equations for head loss: Hazen-Williams Equation, Manning's Equation and Darcy-Weisbach Equation. The Hazen-Williams equation, which is an empirical formula applicable to turbulent flow, is the most frequently used and therefore, was used in the Water Model.

6.2.1 Data Sources

LPVCWD provided the necessary information that was required for the development of the hydraulic water system model for their 2017 master plan. The following information was used:

- LPVCWD's 2009 Master Plan
- LPVCWD Water Atlas maps
- GIS Files
- Digital Elevation Model (DEM) provided within InfoWater
- Historical water production data records
- Facility Drawings provided by LPVCWD of booster stations
- So Cal Edison (SCE) pump efficiency test results
- Facility Controls provided by LPVCWD, such as:
    - Tank water levels
    - Pump controls and settings of pressure regulating valves
    - Well and booster operational controls
- Fire Hydrant flow field testing results

Other additional data was obtained over the course of creating the master plan with the assistance of LPVCWD's General Manager, Water Production Supervisor and staff by numerous meetings and coordination.

6.3 Water Model Construction

Model Construction consisted of database programming of all fixed data and variable data required to perform hydraulic calculations in the LPVCWD system.

6.3.1 Input Data and Simulation Conditions

Input data (aka boundary conditions) are broken down into fixed data and variable data.

Fixed Data

The bulk of Water Model construction revolves around programming fixed data into the databases. These fixed data were drawn largely from the GIS files and Water Atlas maps provided by LPVCWD as well as other publicly available documents and files.

Fixed data does not change with time, and are generally described as infrastructure (i.e. the location, alignment, geometry and connectivity of pipes, pumps, valves, tanks, and aquifers). The Water Model stores fixed data as Element Databases, and the user selects precisely which elements to include in a simulation by defining a Facility Set (i.e. a collection of Element Databases).

When constructing the Water Model, the LPVCWD GIS files and Water Atlas maps contained information on:

- District boundaries
- Pipes – alignments, materials, diameters, years of installation, and connectivity
- Plants – layouts, components (tanks, Wells, pumps, valves)
- Fire Hydrant locations
- PRVs – locations

Supplemental vertical control data for Water Model construction were acquired from a digital elevation model (DEM) complementary of InfoWater. InfoWater uses its "elevation extractor" tool to extract invert elevations of junctions from the DEM file to create the elevation data. The coordinate system used for the Water Model is *NAD 1983 State Plane California V FIPS 0405 (US FEET).*

Variable Data

Variable data are subject to change with time, including pump or valves settings and controls, demands, etc. The Water Model stores variable data as Data Subsets, and the user selects precisely which variable data to include in a simulation by defining a Data Set (i.e. a collection of Data Subsets). Some of these data are within LPVCWD's power to control, such as pump activity and valve settings.

Use of Pump Efficiency Test Data

To assure the Water Model corresponds as closely as possible to field conditions and operational preferences, all pumps were programmed per data provided by LPVCWD including the most recent SCE pump efficiency tests for all Wells and booster pumps, and operational settings for pumping facilities and control valves.

The Water Model requires each pump to be programmed to respond to variation in intake and discharge pressure according to a performance curve. A performance curve describes the relationship between flow (Q) and total hydraulic head[1] (H) inherent in the physical properties of the pump mechanism.

[1] Head refers to the energy transferred from the pump to the water. It is typically given in units of feet, which may be thought of as the energy required to raise the water a certain number of feet above its current level.

The performance curves used in this update are called design point curves. A design point curve uses a single point (i.e. head and flow) to generate a generic curve approximating the pump's actual performance. These points were taken directly from the most recent pump efficiency tests. The Water Model calculates a parabola that passes through the following set of points to approximate the curve:

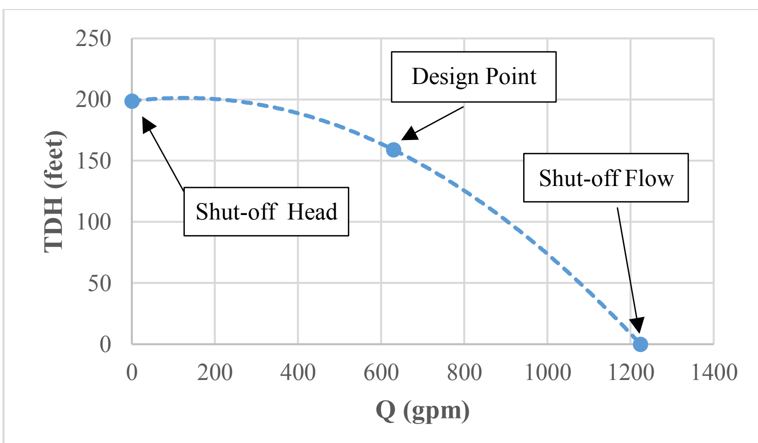
- design point (H, Q)
- shut-off head (1.3H, 0)
- shut-off flow (0, 2Q)

For example, the Main Street Booster Pump No. 1 was rated by SCE to have a flow of 630 gpm at a total dynamic head of 158.9 feet. The Water Model computed the second-degree polynomial curve for the Main Street Booster Pump No. 1 based on that design point as shown in **Table 6-1** and **Figure 6-1**.

Table 6-1 – Input Data for Main Street Booster Pump No. 1

Point	H (feet)	Q (gpm)
Shut-off Head	206.6	0
Design Point	158.9	630
Shut-off Flow	0	1,260

Figure 6-1 – Design Point Curve for Main Street Booster Pump No. 1



Similar curves were calculated for all other booster and Well pumps in the distribution system. The Water Model uses these curves in its iterative steady state solution to determine the energy imparted to the water by the pump when the pump is active.

Simulation Conditions

Once all the input data is programmed, simulations can be programmed. Prior to initiating the simulation, the user defines the conditions of the simulation (i.e. the calculation to be performed). Conditions used in the preparation of this report include:

- Steady State Simulation (a single solution at a moment in time)
- Fire Flow Simulation (a series of steady state solutions assuming a fire flow demand is applied to designated hydrant locations in turn)
- Multi-Fire Flow Simulation (a steady solution describing the performance of multiple hydrants flowing simultaneously)

The power of the Water Model is to save and recall any combination of fixed data, variable data and simulation conditions. These are referred to as Scenarios in the Water Model.

6.3.2 Demand Allocation

Water demand was allocated to the Water Model on a pressure zone by pressure zone basis. With the help of previous master plans and guidance of LPVCWD's staff, the demand was distributed by pressure zone for each scenario with the help of the peaking factor calculated.

The existing water demands in the Water Model are allocated using actual water produced obtained from LPVCWD's production data for the study period of 6 years from 2010 through 2016. The future water demands are allocated using the year 2020 demand projections, determined based on land use and population growth as discussed in Chapter 2. The process of how the allocation of both existing and future water demands to model nodes is described below.

Existing Demands

The water demands for existing conditions are based on actual production data obtained from the Wells provided by LPVCWD. The production data covers the water produced per day for each study period calendar years between 2010 and 2016.

After reviewing and analyzing data, a summary was created for each pressure zone within the LPVCWD's water system. Once the summary was completed, the demand for each pressure zone was distributed approximately per each node. These nodes represent meters to home, intersection of pipeline mains and cul-de-sac ends. **Table 6-2** below shows each pressure zone within LPVCWD's water system and their corresponding demand per each scenario.

Table 6-2 – Existing Demands within Water System

Pressure Zone	Nodes Programmed	ADD (gpm)	MDD (gpm)	PHD (gpm)
PZ 1	344	719	1,588	2,380
PZ 2	116	309	682	1,023
PZ 3	7	18	38	59
PZ 4	21	25	56	83
PZ 5	6	4	9	13
Total Demand (gpm) per Scenario	**494**	**1,075**	**2,373**	**3,558**

Future Demands

For the allocation of future demands, the projected water demand as described in Chapter 2 was programmed to reflect the projected average demand for the calendar year of 2020. The number of service connections increase at an average rate of approximately 1% per year. With this growth rate for LPVCWD, along with the existing average demands, the future demands were calculated and summarized.

Table 6-3 shows each pressure zone within LPVCWD's water system and their corresponding demand per each scenario.

Table 6-3 – Future (YR 2020) Demands within Water System

Pressure Zone	Nodes Programmed	ADD (gpm)	MDD (gpm)	PHD (gpm)
PZ 1	353	755	1,666	2,499
PZ 2	119	329	726	1,088
PZ 3	8	19	41	62
PZ 4	22	26	59	88
PZ 5	10	4	9	13
Total Demand (gpm) per Scenario	**512**	**1,133**	**2,501**	**3,750**

Development of Modeling Scenarios

Modeling scenarios are used in the water model to provide means to store different facility sets, operation conditions and data sets. For the LPVCWD model, three different steady state scenarios were created for simulation. These scenarios were (1) Average Day Demand (ADD), (2) Maximum Day Demand (MDD) and (3) Peak Hour Demand (PHD).

The ADD Scenario would serve as a benchmark and as a planning tool for long-term issues at the system level, such as supply acquisition and integrated resources management.

The MDD Scenario would serve as a planning tool at the pressure zone level. MDD is the peak loading for typical booster-reservoir pressure zones for analysis of supply requirements. MDD is intended to determine the system's capacity to meet fire flow requirements under a worst-case scenario while maintaining a minimum residual pressure of 20 psi throughout the system.

The PHD Scenario would serve as a planning tool at the pipe level. Pipes must function adequately under this loading. PHD is intended to examine the impact of the worst case normal operating scenario on both transmission and distribution pipe velocity and system pressures.

Output Data

Following a successful simulation, Water Model output data include (1) pressure at every point, (2) flow and energy losses through every pipe and (3) performance of every valve, pump and tank. Data output format may be tabular, graphic or both depending on the nature of the Scenario.

6.4 Model Calibration

Calibration was achieved by making incremental adjustments to elements in the Water Model associated with energy loss until modeled results and field data were comparable. Energy losses occur due to friction between flowing water and pipe walls, and due to changes in the momentum of flowing water. In general, friction losses are the primary sources of energy losses in any distribution system which is essentially comprised of relatively long and straight small diameter pipelines that carry water at low velocities.

Production, treatment and booster facilities also experience energy losses caused by changes in momentum due to plant components that influence the flow stream such as control valves, tank inlets and outlets, bends, meters, manifolds, and treatment vessels.

6.4.1 Steady State Calibration

Steady state calibration focuses on verification of vertical control and energy losses due to friction in the system.

Vertical control was established by two means: verification of elevations from historical maps and comparison of historical fire flow records to model results.

The basemap includes elevation data at key intersections throughout the system. Water Model elements adjacent to these intersections were assigned the basemap elevation and elements between these intersections were assigned an interpolated value.

Each fire flow record contains a static pressure measurement at a specific point and time. A comparison was made between the historical records and model output, and adjustments were made to the Water Model elevations to bring model output into agreement with these field data.

Energy losses in the system are the result of friction between flowing water and the interior of the pipe walls. For purposes of the Water Model, the pipe roughness is described by a coefficient known as the Hazen-Williams roughness coefficient (aka C-factor). Flow tests were conducted to measure energy losses in a number of pipes in the LPVCWD system.

CHAPTER SEVEN – WATER CONSERVATION PROGRAMS

7.1 General Description

Chapter 7 provides guidance for the implementation of a water conservation program in line with LPVCWD's goals.

By convention, a water conservation project is the implementation of a unique methodology for achieving water use reduction, and a water conservation program is a set of projects implemented collectively to achieve a water conservation goal.

7.2 Existing Water Conservation Projects

The LPVCWD's water conservation program is largely a coordinated effort involving the Upper District. The following activities provide water conservation:

1. Ultra-High Efficiency Toilet [administered by LPVCWD]
2. Large landscape audits of LPVCWD customers [administered by Upper District]
3. Toilet giveaway [administered by Upper District]

7.3 Approach to Water Conservation

The general water conservation approach is to define a goal, then implement a cost-effective program to meet that goal. Since water conservation goals are typically long-term, it is important to monitor progress toward the goal and make adjustments as needed to remain on the path towards achievement.

LPVCWD has no clear defined mandate or internal goal for water use reduction, and has requested an incremental approach that relates investment to water use reduction for further consideration. With this in mind, the following approach is recommended:

1. Create a list of candidate water use reduction projects.
2. For each project, develop an economic model that relates investment to volume of water saved.
3. Determine the combination and intensity of projects that correlate investment to volume of water saved.
4. Implement the program and monitor water use reduction.
5. Make period adjustment as needed based on program performance.

7.4 Cost and Accounting Conventions

Volumetric commodity rates will be converted to thousands of dollars per million gallons ($K/MG).

Water conservation project performance is a combination of project implementation costs and the associated impact to revenue.

Recommendations for project implementation can be given as a target range with limits corresponding to a percentage of the maximum water use reduction assigned to the project. This is equivalent to a range of costs. Included in the range of costs will be the level of intensity associated with the optimal cost solution.

The target cost ranges and optimal costs may be given for the 5-year period ending in 2020. This will provide a starting point for project funding and implementation. When documentation of water conservation projects is recorded, the data may be analyzed to determine the most optimal water conservation solution considering economics and water savings.

7.5 Water Conservation Program Scope and Goals

The scope of the water conservation is a planning horizon and a level of water use reduction. The planning horizon may be set at five years (i.e. 2020), which coincides with the guidance of the UWMP Act. However, LPVCWD is not obligated to comply with the provision of the UWMP Act as its number of service connections and retail water sold falls under the threshold for such requirement. The level of water use reduction can be presented as a curve relating investment to volume saved with proper data. This curve is intended to serve as guidance to LPVCWD in choosing a preferable level of water use reduction and programs that are most beneficial for implementation.

7.6 Candidate Water Conservation Programs

Ten potential water use reduction projects can be considered for future projects and accounting as follows:

- Recycled Water
- Audit, Leak Detection and Repair
- Smart Meters
- Turf Removal
- Residential ULF Toilets
- Residential Survey
- Irrigation Controllers
- Plumbing Retrofit
- HE Washing Machine

The subsections that follow provide descriptions of each project which may be utilized in future efforts in the development of economic models.

7.6.1 Recycled Water

Recycled water is a low-quality alternative to potable water and is suitable for irrigation and certain industrial uses. To meet health regulations, recycled water must be distributed via a dedicated system separate from the potable water system. LPVCWD has performed a recycled water study demonstrating the potential demand for recycled water and the level of dedicated infrastructure needed to implement a recycled water distribution system.

7.6.2 Audit, Leak Detection and Repair

Per CUWCC (2005), this activity consists of three components:

- System audits
- Leak detection
- Leak repair

Per AWWA (1999), system audits include quantifying all produced and sold water, and includes testing meters, verifying records and maps, and field checking distribution controls and operating procedures. The objective is to determine the amount of water that is lost and unaccounted for in the system. System audits may identify losses from:

- Accounting procedure errors
- Illegal connections and theft
- Malfunction distribution-system controls
- Reservoir seepage, leakage, and overflow
- Evaporation
- Detected and undetected leaks

Leak detection is the process of searching for and finding leaks in the system with sonic, visual, or other indicators. It should be noted that sonic and acoustic leak detection equipment have been found to be more accurate for smaller systems than for larger systems. Audits and detection programs incur costs whether or not repairs are made; thus, audits and detection alone do not save water. Conversely, leaks are sometimes discovered without organized audit and detection programs.

7.6.3 Smart Meters

Smart Meters work in tandem with leak detection and repair to reduce water loss (more specifically non-revenue water) by identifying defective meters for replacement and inaccurate meters for recalibration. The Smart Meters project would complement a meter replacement program by getting the most out of new assets through efficient application.

A Smart Meter is an electronic transmitter that collects real-time consumption data and sends it to a central processing unit for analysis. Needed infrastructure includes transmission towers for collection of radio transmissions, and a computer system for data processing. The computer system detects anomalies in meter data that may be due to meter inaccuracy or to leaks on the customer side of the meter.

7.6.4 Turf Removal

Turf removal means replacement of high water demand landscaping with more drought tolerant landscaping.

7.6.5 Residential ULF Toilets

This project seeks to replace standard residential toilets with ultra-low-flush toilets.

7.6.6 Residential Survey

Per CUWCC (2005), residential home surveys target both indoor and outdoor water use. In practice, home surveys usually include a site visit by trained staff that: (1) solicits information on current water use practices; and (2) makes recommendations for improvements in those practices. Sometimes, indoor plumbing retrofit devices are directly installed when appropriate. The outdoor portion of the survey can vary widely, ranging from an intensive outdoor water efficiency study (turf audit, catch can test, and written recommendations for irrigation scheduling or landscape changes) to simple provision of a brochure on outdoor watering practices.

7.6.7 Irrigation Controllers

Per CUWCC (2005), this project addresses technologies that automatically adjust irrigation controllers according to the needs of the landscaping. In particular, this project covers technologies that have been developed to adjust schedules according to real-time measures of evapotranspiration (ETo)—or water needs more generally—including temperature, rainfall, soil moisture, and/or sunlight. Historical weather data may also be used in the controller programs. Some of these systems transmit information to the irrigation controller by satellite pager and some include two-way communication via telephone lines.

7.6.8 Plumbing Retrofit

Per CUWCC (2005), residential plumbing retrofit involves modifying the following fixtures with low flow devices: showerheads, toilets and faucets.

Low flow (LF) showerheads are designed to provide water at lower rates of water flow. Flow is typically measured in gallons per minute and low flow showerheads are rated at 2.5 gallons per minute (gpm) or less (at pressure levels up to 80 psi). California state law currently requires that all showerheads sold in the state meet the 2.5 gpm standard.

Toilet displacement devices come in a variety of designs that displace some water volume in the toilet tank. Since less water is needed to refill the tank, less water is used per flush. Toilet leak detection is typically performed with dye tablets. Faucet aerators reduce flow from faucets.

7.6.9 High Efficiency Washing Machines

This project seeks to replace standard residential washing machines with those designed to save energy and water.

CHAPTER EIGHT – EVALUATION CRITERIA

8.1 General Description

Design and planning criteria are used (1) as a benchmark for evaluating the capacity of the existing water distribution system and (2) as a guide for recommending improvements to meet future conditions. As a convention, each criterion or set of criteria is indicated in italics followed by a detailed description of its purpose and the driving factors behind its inclusion.

8.2 Study Period

Water demands for existing conditions are based on the production data collected by LPVCWD. The production data covers the study period between January 2009 through December 2016.

8.3 Design Criteria

Design Criteria are used to evaluate the hydraulic capacity of the distribution system. Such an evaluation is a quantitative analysis comparing field measurements or engineering calculations with a series of benchmarks that reflect customer expectations, the regulatory environment, sustainable design, redundancy, reliability, functionality, emergency preparedness, efficiency, economics, and other issues of importance to LPVCWD.

8.3.1 System Pressure

Goal for normal system pressure range: 40psi to 125 psi.

The level of service that is provided for domestic use is based on the available water pressure. A minimum pressure of 40 psi is consistent with the Water Code[1].

Per the City and LPVCWD 2009 Master Plans, 120 psi was the highest observed service pressure. Note that 150 psi is the typical pressure rating for distribution system components and the Plumbing Code recommends individual pressure regulators for any service pressure over 80 psi[2].

It is recommended a goal for service pressure to range from 40 psi to 125 psi. This pressure range minimizes negative impacts to customers along with the water distribution system, and should be readily achievable based on historical system performance documentation.

Goal for minimum service pressure during fire: 20 psi.

Under fire flow conditions, residual pressures should not fall below 20 psi[3] when delivering the required fire flow rate. The minimum residual pressure requirement is established by the DDW.

[1] Title 22, Chapter 16, §64602

[2] Individual pressure regulators should be installed on any services that could have pressure greater than 80 psi at the meter as recommended in Section 1007 (b) of the California Plumbing Code. It is typically the customer's responsibility to install and maintain these pressure regulators at their own expense.

[3] Title 22, Chapter 16, §64602

This threshold provides a buffer against the possibility of negative pressure in the distribution system which could result in contamination ingress. Guidance on fire flow requirements for (1) subdivision of land, (2) construction of buildings, and (3) alteration/installation of a fire protection water system is provided by Los Angeles County Fire Department Regulation #8 (V7-C1-S8, Fire Flow and Hydrant Requirements, see **Appendix E**). An exception to the 20-psi minimum is allowed for fire hydrants that are located so close to reservoirs as to not be able to achieve the requirement for pressure residual. These hydrants shall be designated as "draft hydrants" and piping shall be sized from the reservoir to the hydrant to provide the fire flow requirement as close to the local static pressure as possible. Note that individual jurisdictions may have varying fire flow requirements. It is recommended to provide a level of fire protection consistent with Regulation #8, and to examine requirements for new construction on an individual basis in cooperation with the local planning jurisdiction and the local Fire Marshal at the developer's expense. The residual pressure requirement is driven by the regulatory environment.

Goal for maximum pressure during minimum hour: 150 psi or pipeline pressure class, whichever is less.

Maximum pressures typically occur (1) at production and transmission facilities such as Wells, booster pumping stations and control valves or (2) at low elevations. Under no circumstances should the pressure in the system exceed the pressure class rating of the pipe. During minimum hour demands when booster and Well pumps are operating to refill reservoirs, pressures should not exceed 150 psi as an ultimate goal, or the pressure rating of the pipe, whichever is lower.

During the normal operation of facilities, a surge of energy may affect the system when a pump is turned on or off or when a control valve is opened or closed. This energy surge creates a pressure wave that could potentially damage sensitive machinery or vulnerable pipelines already under high pressure. Various devices and operational techniques should be installed or implemented to mitigate the negative impacts of surge and to assure that pressures do not exceed 150 psi or the pressure class of the pipe, whichever is greater.

The goal for maximum system pressure is driven by sustainable design.

8.3.2 Supply

Pressure Zones with Gravity Storage

In pressurized systems, the hydraulic gradient is established artificially and maintained by a pressure regulating device. The sources of supply to pressurized systems must be capable of delivering all normal and emergency flows.

Combined production capacity of maximum day demand with largest single source out of service.

For each pressure zone with gravity storage, the sum of the sources of supply (with the largest single source of supply off-line) must be able to provide dependent MDD[4]. The concept of supply

[4] Title 17, Chapter 16, §64554

includes all normal methods by which water enters a pressure zone such as Wells, booster pumping stations, pressure reducing stations, and interties. As such, the design engineer has a degree of flexibility in combining various sources to meet the supply requirement.

Note that dependent MDD takes into account the staging of produced water from pumping to higher pressure zones that are dependent on sources in lower pressure zones.

Combined production capacity sufficient to refill emergency and fire storage in two days (48 hours) under MDD conditions with all sources operating.

A depletion of emergency and fire storage creates a temporary vulnerability to immediate, ongoing or subsequent events that would otherwise be mitigated. This vulnerability can be minimized by rapid replenishment of storage. Therefore, normal supply capacity must be sufficient to refill emergency and fire storage in two days (48 hours) under MDD conditions with all sources operating.

Pressure Zones without Gravity Storage

If gravity storage is not available, supply capacity must satisfy two conditions with the largest single source out of service:

Combined production capacity of maximum day demand with fire flow at 20 psi.

PHD at a minimum system pressure of 40psi.

8.3.3 Storage Capacity

Sum of Operational, Fire and Emergency Storage in each pressure zone.

- Operational Storage: 30 percent of maximum day demand
- Fire Storage: per LA County Fire Dept. Regulation #8
- Emergency Storage: 24 hours at maximum day demand

The principal functions of storage are:

- To equalize fluctuations in hourly demand so that extreme and rapid variations in demand are not imposed on the source of supply
- To provide water for firefighting
- To meet demand during an emergency such as a disruption of the major source of supply, a power outage, a pipe break, or other unforeseen emergency or maintenance issue

Operational Storage: Operational storage describes the volume needed to equalize the difference between supply and demand over the course of a day. Maximum operational storage would typically occur under the maximum day demand conditions. The volume of operational storage, as an industry standard, averages between 20 to 30 percent of maximum day demand. As a result, the recommended operational storage should be equal to 30 percent of maximum day demand for all pressure zones with storage. The operational storage requirement is driven by system functionality.

Fire Storage: The water system should be capable of meeting maximum day demand and firefighting requirements simultaneously. Fire storage represents one maximum event in terms of fire flow and duration. The fire storage requirement is driven by emergency preparedness.

Emergency Storage: Emergency storage is required to meet demands during times of planned and unplanned equipment outages such as pump breakdown, power failure, pipeline rupture, etc. Emergency storage is estimated based on the water supply to a pressure zone being out of service for a period of 24 hours under maximum day demand conditions. The emergency storage requirement is driven by emergency preparedness.

8.3.4 Pressure Reducing Stations

Capacity equals MDD plus Fire Flow or PHD within the continuous rating of valves.

Maximum intermittent flow rating of valves for fire flows is acceptable at 20 psi and 40 psi respectively.

In general, pressure reducing stations should be provided when needed to supplement deliveries to lower pressure zones or pressure sub-zones. Pressure reducing stations should also be considered when distribution piping is operated at or above the maximum pressure rating of the pipe. Pressure reducing stations shall be sized to meet peak hour demand or maximum day demand plus fire flow, whichever is greater, within the continuous flow rating of the valves. It is recommended that three valves be installed within each pressure reducing station that is intended to feed a small closed pressure zone. Two smaller valves should be installed that combined, can provide MDD. One larger valve should be installed that can provide all flow required in the zone.

8.3.5 Pipeline Sizes

Standard pipe size

Use standard pipe sizes of 6, 8, 12, 16 and 24-inches for distribution. The diameter of a replacement pipeline should be a minimum of 8-inches, unless hydraulic analysis demonstrates that a 6-inch pipeline will suffice. Use of nominal pipe diameters is driven by economics and standardization.

8.3.6 Transmission Mains

Maximum pipe velocity under normal operating conditions: 5 feet per second.

Maximum energy loss under normal operating conditions: 10 feet of head loss per 1000 feet of pipe.

Booster station intake and discharge pipelines sized for maximum pipe velocity of 5 feet per second.

Booster station intake and discharge pipelines sized for maximum energy loss of 10 feet of head loss per 1000 feet of pipe.

Transmission mains are intended to efficiently carry water at a high flow rate between facilities (i.e. production, treatment, booster stations, and storage). Energy losses along transmission corridors can be managed/reduced by controlling pipe velocity. The primary methods for controlling pipe velocity are (1) increasing pipe diameter, (2) providing multiple flow pathways and (3) reducing flow rate. Regardless of the method used, efficiency drops rapidly when pipe velocity exceeds 5 feet per second. Note that velocity and energy loss (i.e. feet of head loss per 1000 feet of pipe) are indirectly related measurements of transmission efficiency and should both be examined independently.

Dramatically over-sizing the transmission mains to reduce velocity can inadvertently increase detention time leading to certain water quality issues. As time increases between the points of production and delivery, complications due to stagnation and decay of disinfectant residual outweigh improvements in energy efficiency. Therefore, a balanced system will simultaneously keep energy loss and water quality degradation in check.

Transmission main capacity criteria are driven by efficiency and water quality management.

Pipe velocity range for reservoir inlet-outlet is 6 feet per second.

A reservoir is a passive system that should simultaneously complement transmission and provide emergency flow. Pipe velocity from a tank increases in response to emergency conditions, but velocities in excess of 6 feet per section represents a bottleneck that may constrict emergency deliveries.

8.3.7 Distribution Mains

Sized to satisfy three conditions:

(1) *Maximum day demand plus fire flow with residual pressure of 20 psi*

(2) *Peak hour demand with a minimum system pressure of 40 psi*

(3) *Maximum pipe velocity: 10 fps under Maximum day demand plus fire flow but 7 fps otherwise*

Distribution mains carry water to service connections and fire hydrants. Fire flow is typically the governing factor in sizing distribution mains, although normal operations under peak demand conditions should also be examined for efficiency. Distribution main design is driven by efficiency and emergency preparedness.

8.3.8 Fire Flow and Fire Hydrant Spacing Requirement

Fire hydrant spacing and flow are specified per LA County Fire Department Regulation #8 or as determined by the Fire Marshall. Fire requirements are driven by the regulatory environment and emergency preparedness.

In general, Regulation #8 provides guidance for determining the fire flow requirements for new construction that consider the following conditions:

- Occupancy and use
- Building materials
- Proximity to adjacent structures
- Ground floor area
- Number of floors
- Access to hydrants
- Allowances for the installation of fire suppression systems

In addition, rules concerning meeting high fire flow requirements with multiple hydrants flowing simultaneously are made explicit.

For purposes of testing the adequacy of the existing system, the following fire flows[5] are applied based on Land Use:

- 1,250 gpm (in min. duration 2 hours)[6]: Single Family Residential
- 3,000 gpm (in min. duration 3 hours)[7]: Multi-Family Residential, Mobile Homes/Trailer Parks, Retail/Commercial Services, Agriculture
- 4,000 gpm (in min. duration 4 hours): Public Facilities, Educational Institutions, Light Industrial, Heavy Industrial, Transportation, Utility Facilities

It is assumed that all fire hydrants met the Fire Marshal's requirements at the time of installation and that those requirements have been "grandfathered" in. Existing residential fire hydrants should have a capacity of 1,250 gpm while new residential fire hydrant new fire flow requirements will be established following one of three actions: new construction, land subdivision or water system upgrade.

8.4 Planning Criteria

Planning Criteria deal with parameters related to cyclical infrastructure refurbishment or replacement due to age and condition. The primary concern of Planning Criteria is to establish the

[5] Fire Flows taken from 2013 California Fire Code, **Appendix E**

[6] Fire Flows may be reduced by up to 50 percent when the building is equipped with an approved automatic sprinkler system.

[7] Fire Flows may be reduced by up to 75 percent when the building is equipped with an approved automatic sprinkler system.

practical service life of each system component and a performance indicator to verify whether maintenance or replacement will result in an economic benefit. These performance indicators may include efficiency, reliability and maintenance history.

Planning criteria deal with cyclical infrastructure replacement due to age, condition and other non-hydraulic factors. It is possible for a pipeline or other of piece of equipment to meet the hydraulic requirements established by design criteria, while at the same time exhibiting costly repairs or downtime due to fatigue, corrosion, normal wear, poor workmanship, incompatibility, or other issues associated with deterioration. Planning criteria provide a secondary methodology for identifying and mitigating vulnerabilities in the system by a combination of qualitative and quantitative analysis.

Planning criteria are not meant to be a rigid set of rules that narrowly define service life; rather, they provide guidance for determining those portions of the distribution system that would benefit most from replacement in advance of higher and unsustainable costs associated with maintenance and inefficiency.

8.4.1 Preferred Replacement Schedule

Well designed and maintained water systems will provide many years of superior performance, but at some point, replacement of individual components is necessary for sustainability.

Table 8- 1 below provides general parameters for determining when a particular component should be considered for replacement. A combination of average service life and performance indication provides more solid justification for capital replacement.

Table 8- 1 - Infrastructure Replacement Criteria

Component	Interval (years)	Indication
Pipeline	AWWA[8]	Frequent repair history, excessive energy losses
Pump/Motor Overhaul	15	Drop in efficiency below 65%
Pump/Motor Replacement	30	Frequent repair history, drop in efficiency
Control Valve Overhaul	25	Leaks, poor response, frequent repairs
Tank Recoating	20	Evidence of corrosion
Tank Replacement	80	Frequency/extent of repair history
Well Refurbishment/Replacement	50	Decline in effective capacity
Production meter calibration	5	Drop in accuracy
Production meter replacement	20	Drop in accuracy and reliability

[8] AWWA outlines expected service life for pipes based on their materials. For systems in the west with fewer than 3,300 service connections, expected pipe service life ranges from 60 to 130 years, depending on materials.

CHAPTER NINE– ANALYSIS AND PROPOSED IMPROVEMENTS

9.1 General Description

The basis for system analysis is a comparison between capacity and requirements. Design and planning criteria provide the instruments for making this comparison.

Design criteria provide a quantitative description of a robust and redundant distribution system from a hydraulic point of view. Whenever existing capacity is found to be inadequate to meet design requirements, mitigation is proposed in the form of capital projects. Such projects should be considered as candidates for mitigation.

Planning criteria are collectively a quantitative and qualitative description of the anticipated service life of each system component. Whenever a system component is found to have simultaneously exceeded its service life and to have exhibited indications of poor condition, replacement is recommended. Such projects should be considered as candidates for replacement.

The conclusion of this chapter is a Capital Improvement Program (CIP) aimed at (1) resolving identified hydraulic issues and (2) cyclical replacement due to issues arising from age and condition. Candidates for mitigation and candidates for replacement have been prioritized by perceived urgency.

9.2 Supply Analysis

The adequacy of the combined sources of supply is subject to redundancy and emergency preparedness. Primary supply design criteria examine the adequacy of all sources to meet normal demands with a degree of redundancy. Secondary supply design criteria examine the system's ability to recover from an emergency event following depletion of emergency and fire storage.

9.2.1 Primary Supply Design Criteria

Primary design criteria related to supply state that there should be sufficient supply to meet MDD with the largest source out of service. **Table 9-1** provides supply capacity per the latest SCE pump efficiency tests and nominal interconnection capacity for imported sources.

Table 9-1 – Supply Analysis

Source	Supply Capacity (gpm)	Existing Conditions (gpm)	Future Conditions (gpm)
Baldwin Park Operable Unit (BPOU)*	2,500	2,500	2,500
LPVCWD (Sum of Interconnection Capacity)	7,100	7,100	7,100
Puente Valley Operable Unit (PVOU)°			1,500
Total Supply Capacity without Largest Source out of Service		2,500	4,000
Maximum Day Demand		2,373	2,492
Surplus (Deficit)		127	1,508
*Production from Well Nos. 2, 3 & 5 is limited to permitted capacity of the LPVCWD Treatment Facility. °PVOU production water is a planned source to be supplied to LPVCWD (See **Appendix G**)			

9.2.2 Secondary Supply Design Criteria

Secondary design criteria related to supply address refill capacity, which should be sufficiently adequate to refill emergency and fire storage within two days under MDD conditions. Emergency storage is equivalent to one day of MDD and fire storage represents the largest single fire flow requirement of 4,000 gpm for four hours. The total requirement is as follows:

$$Q = \frac{(MDD) * (24\ hours) + (4{,}000 gpm) * (4\ hours)}{48\ hours} + MDD$$

Table 9-2 provides a summary and calculation of the refill requirement.

Table 9-2 – Supply Emergency and Fire Refill Requirement

Period	Emergency Storage (MG)	Fire Storage (MG)	Total Refill Volume (MG)	Equivalent Refill Flow Rate (gpm)	MDD (gpm)	Total (gpm)
Existing	3.42	0.96	4.38	1,520	2,373	3,893
Future	3.59	0.96	4.55	1,579	2,492	4,071

Table 9-3 demonstrates the application of the secondary supply criteria.

Table 9-3– Supply Emergency and Fire Refill Analysis

Source/Demand	Supply Capacity (gpm)	Existing Conditions (gpm)	Future Conditions (gpm)
Baldwin Park Operable Unit (BPOU)	2,500	2,500	2,500
LPVCWD (Sum of Interconnection Capacity)	7,100	7,100	7,100
Puente Valley Operable Unit (PVOU)			1,500
Total Supply		9,600	11,100
Maximum Day Demand		3,893	4,071
Surplus (Deficit)		5,707	7,029

9.2.3 Potential Sources of Supply

Given that District has agreed to operate the Puente Valley Operable Unit Intermediate Zone (PVOU IZ) treatment facility, the District will receive fully treated water into its water system and will utilize this water as a back-up supply for the District and for neighboring water purveyors. Based on the current treatment facility design and project schedule, the District may be able to receive up to 1,500 gpm as a source of back-up supply by 2020.

9.2.4 Supply Recommendation

Application of primary supply design criteria indicates a slight surplus under existing and future conditions. The secondary design criteria related to supply indicated the refill capacity during an emergency has an adequate amount of supply with a surplus of over 7,000 gpm. Given these conditions and by applying the potential PVOU IZ water as a source of back-up supply to the list of sources, the District will have greater primary and secondary supply reliability.

9.3 Analysis of Storage Facilities

Per storage design criteria, minimum capacity is equivalent to the sum of emergency, operational and fire storage.

Emergency storage is one day of MDD.

$$V_{Existing\ Emergency} = \left(\frac{2{,}373 gallons}{minute}\right) * \left(\frac{60\ minutes}{1\ hour}\right) * (24\ hours) = 3.42\ MG$$

$$V_{Future\ Emergency} = \left(\frac{2{,}492 gallons}{minute}\right) * \left(\frac{60\ minutes}{1\ hour}\right) * (24\ hours) = 3.59\ MG$$

Operational storage is 30% of one day of MDD.

$$V_{Existing\ Operational} = (0.3) * (3.42\ MG) = 1.03\ MG$$

$$V_{Future\ Operational} = (0.3) * (3.59\ MG) = 1.08\ MG$$

Fire Storage is the requirement for one maximum event:

$$\left(\frac{4{,}000 gallons}{minute}\right) * \left(\frac{60\ minutes}{1\ hour}\right) * (4\ hours) = 0.96\ MG$$

Both the LPVCWD and CIWS systems are considered to be widely interconnected and as a result may share storage. Storage in the Industry Hills Reservoirs is available to all Zones in both systems and water can automatically move to lower Zones as needed to supplement storage reserves in lower zones if the emergency and fire flow reserves were to be depleted from those zones. As a result, Industry Hills reservoirs are considered in this analysis. **Table 9-4** provides the storage capacity in the Zone served and volume.

Table 9-4 – Existing Storage Capacity

Reservoir Name	Zone Served	Nominal Volume (MG)
Hudson	Zone 1	0.1
Main Street No. 1	Zone 2	3.0
Main Street No. 2	Zone 2	1.8
Industry Hills No. 1	Industry Hills	1.4*
Industry Hills No. 2	Industry Hills	1.4*
Total		7.7

*Capacity is shared with CIWS. Only surplus storage can be allocated to LPVCWD.

Table 9-5 summarizes and compares the calculations for available and required storage.

Table 9-5 – Storage Analysis

Period	Storage Requirement Type (MG)			Total Requirement (MG)	Total Available (MG)	Surplus (MG)
	Emergency	Operational	Fire			
Existing	3.42	1.03	0.96	5.41	7.7	2.29
Future	3.59	1.08	0.96	5.63	7.7	2.07

9.3.1 Storage Recommendation

Based on the water supply agreement in place between LPVCWD and CIWS, the systems are considered to be widely interconnected, and as a result, have adequate storage supply.

9.4 Analysis of Booster Facilities

Per supply design criteria, there should be sufficient booster pumping capacity in each pressurized zone without gravity storage to meet (1) combined production capacity of maximum day demand with fire flow at 20 psi, and (2) PHD at a minimum system pressure of 40 psi. When gravity storage is present, the booster pump must have the capacity to supply maximum day demand when the largest pump is out of service.

Note that the system's capacity in Zone 1, 2, 3 and 4 is interdependent on booster pumping capacity and pipeline efficiency. With this mind, the following is a determination of whether booster capacity can meet minimum requirements.

9.4.1 Pressure Zone 1 Booster Capacity (Hudson Booster Station)

There are three booster pumps at the Hudson Booster Station which serve Zone 1 and also serve the entire dependent demands of Zone 2, 3 and 4. Water is pumped from the Hudson Reservoir through Zone 1 to the Main Street Reservoirs. For redundancy, the capacity of one of the pumps is calculated and the sum of the capacities of the remaining two pumps is utilized to determine the adequacy of the booster station. The production of two pumps at the Hudson Booster Station is 2,500 gpm. The dependent demand of the Station under near term conditions is 2,492 gpm. The Hudson Booster station can achieve the MDD requirement for the system.

The highest water surface elevation in the Main Street Reservoir is at 488 feet.

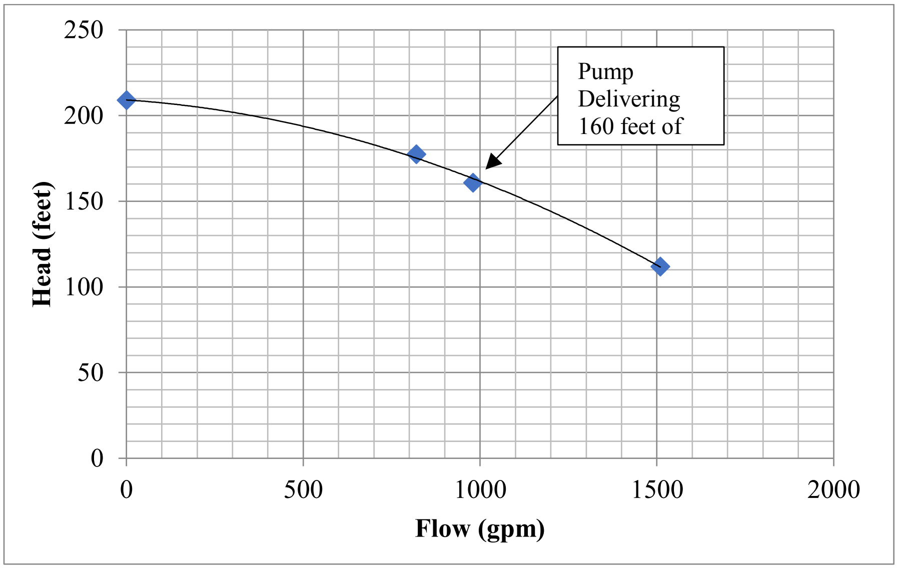
Assuming the water surface in Hudson Reservoir is 328 feet, the pump should add a minimum of 160 feet of head not considering frictional head losses:

$$488\ feet - 328\ feet = 160\ feet$$

The dependent MDD to the Hudson Booster Station to supply the demand for the entire LPVCWD system is 2,492 gpm.

Figure 9-1 shows the available flow of 975 gpm when Pump 1 is delivering 160 feet of head. Pump curves for Hudson have been adjusted based on recent Edison hydraulic efficiency test results.

Figure 9-1 – Hudson Pump vs. MDD Requirements



Two pumps alone producing 1,950 gpm cannot achieve the dependent MDD requirement of 2,492 gpm in Zone 1 and dependent Zones.

9.4.2 Pressure Zone 2 Booster Capacity

There are three booster pumps that serve Zone 2. Since the design flow and head of each pump are different, all three pump capacities are calculated to check that they are able to handle all demand conditions.

The highest service elevation in Zone 2 is at 541 feet.

MDD + FF

To achieve 20 psi fire flow residual pressure at this location, the hydraulic gradient should be at least 587 feet:

$$541\ feet + \left(\frac{20\ lbs}{in^2}\right)\left(\frac{12\ in}{foot}\right)^2\left(\frac{ft^3}{62.4\ lbs}\right) \cong 587\ feet$$

Assuming the water surface in Main Street Reservoir is 469 feet, the Pumps should add 113 feet of head:

$$587\ feet - 469\ feet = 113 feet$$

MDD plus fire flow in Zone 2 is 2,092 gpm including the dependent MDD of 117 gpm for Zone 3 (see Section 9.4.3). The fire flow requirement in Zone 2 is 1,250 gpm.

Figure 9-2 shows the available flow of 1,050 gpm for Pump No. 1 when delivering 113 feet of head. **Figure 9-3** shows the available flow of 1,225 gpm when Pump No. 3 is delivering 113 feet of head (pump curves have been adjusted based on most recent SCE efficiency test).

Figure 9-2 – Pump 1 vs. MDD + FF Requirements for Zone 2

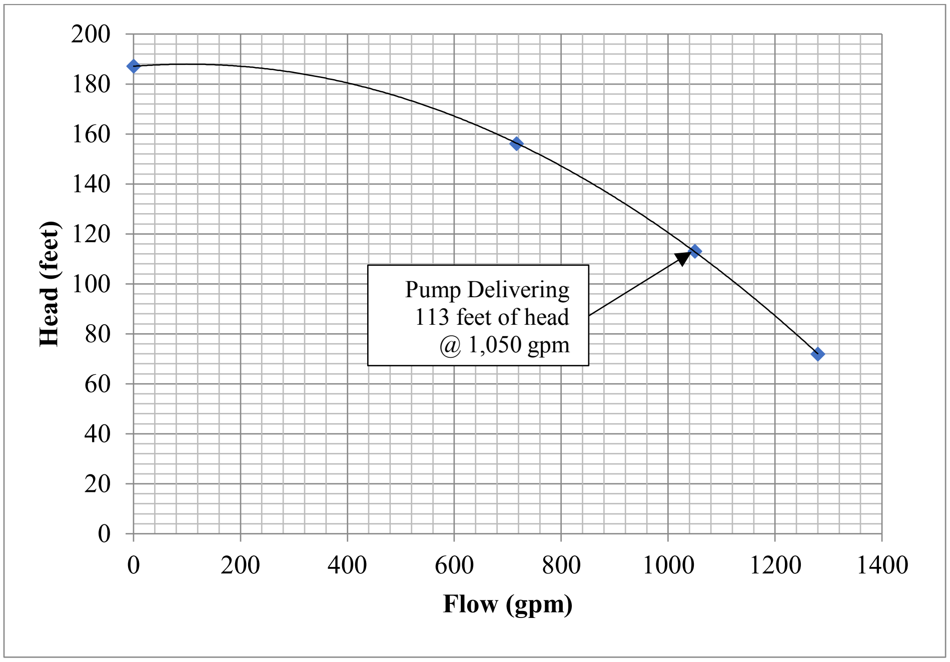
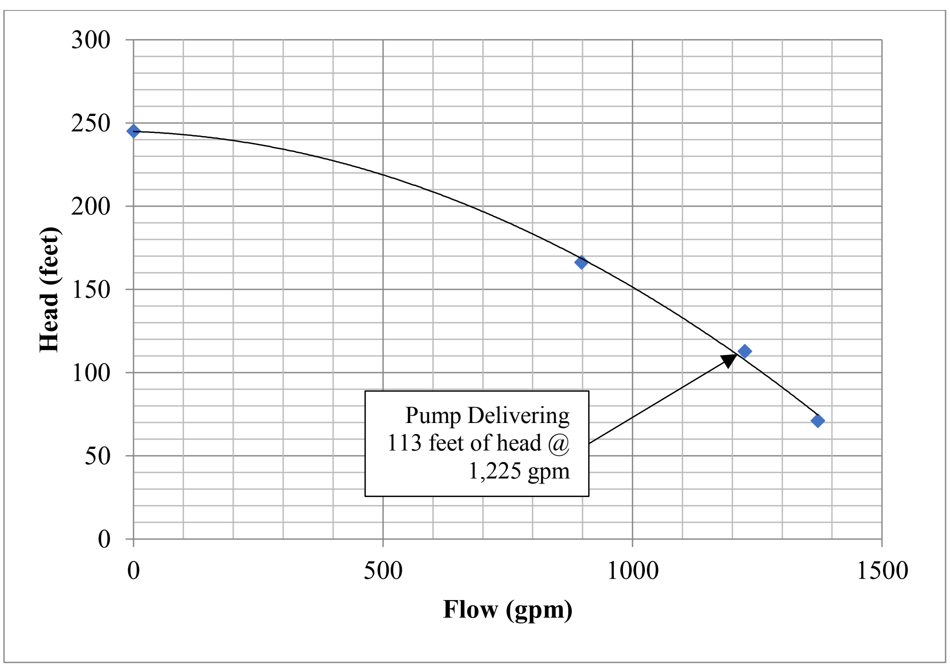


Figure 9-3 – Pump 3 vs. MDD + FF Requirements for Zone 2



The two smaller pumps producing 2,275 gpm can achieve the MDD+FF requirements of 2,092 gpm in Zone 2 when considering the largest pump out of service.

PHD

To achieve 40 psi fire flow residual pressure at this location, the hydraulic gradient should be at least 633 feet:

$$541\ feet + \left(\frac{40\ lbs}{in^2}\right)\left(\frac{12\ in}{foot}\right)^2\left(\frac{ft^3}{62.4\ lbs}\right) \cong 633\ feet$$

Assuming the water surface in Main Street Reservoir is 469 feet, Pump should add 164 feet of head:

$$633\ feet - 469\ feet = 164\ feet$$

PHD in Zone 2 is 1,023 gpm.

Figure 9-4 shows the available flow of 650 gpm for Pump No. 1 when delivering 164 feet of head.

Figure 9-5 shows the available flow of 925 gpm for Pump No. 3 when delivering 164 feet of head. Two pumps can achieve the PHD requirement in Zone 2.

Figure 9-4 – Pump 1 vs. PHD Requirements for Zone 2

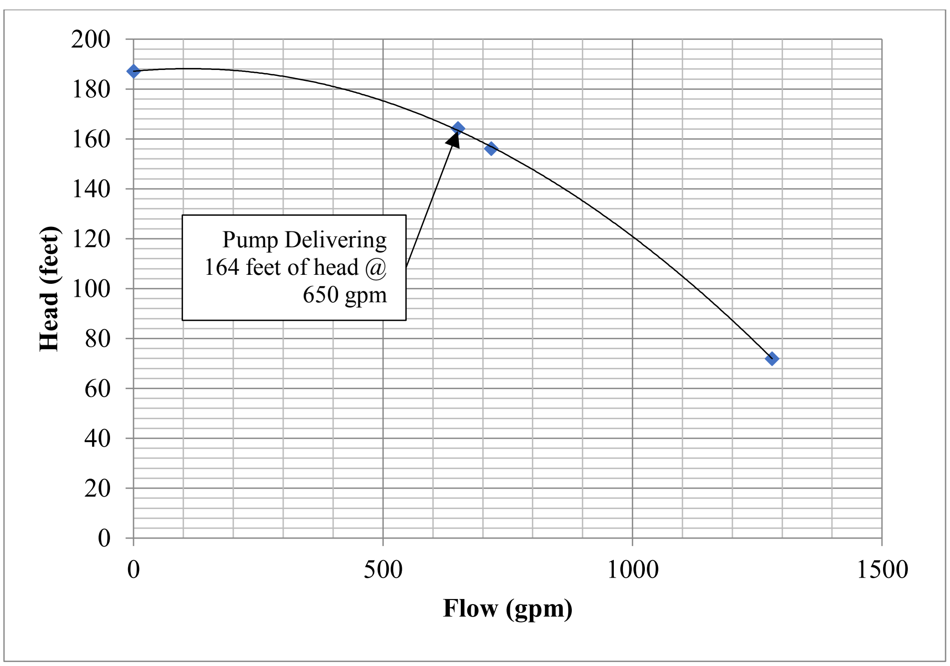
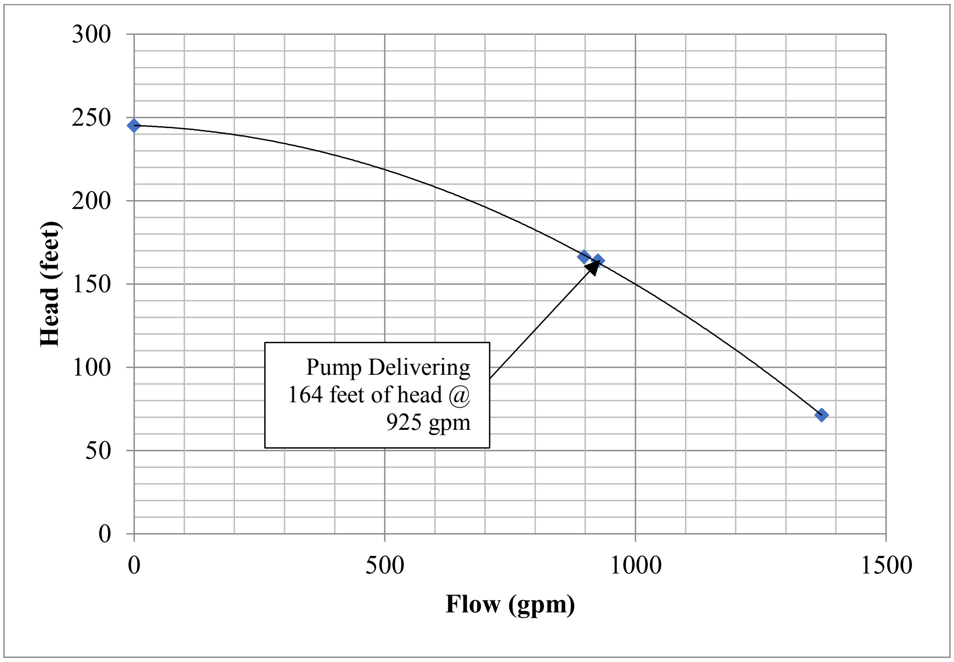


Figure 9-5 – Pump 3 vs. PHD Requirements for Zone 2



9.4.3 Pressure Zone 3 Booster Capacity

There are two booster pumps in Zone 3. Both pumps are normally operated to replenish the Industry Hills Reservoirs to replace the water used by LPVCWD in Zone 3. The capacity of each pump is calculated to check that it is able to handle the anticipated demand conditions.

The highest water surface elevation in the Industry Hills Reservoirs is at 777 feet.

MDD

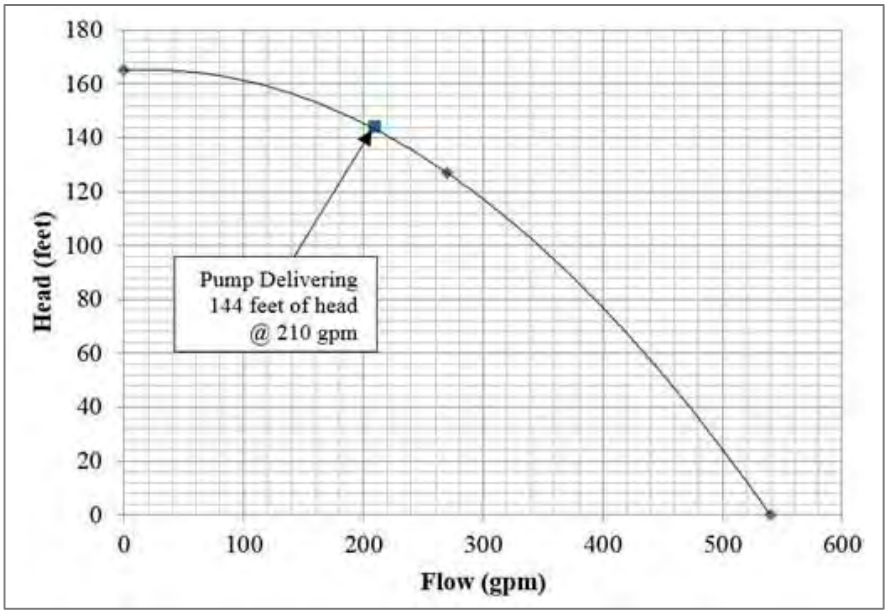
Assuming the water surface in Zone 2 is 633 feet, the Pump should add 144 feet of head:

$$777\ feet - 633\ feet = 144\ feet$$

MDD in Zone 3 is 39 gpm.

Figure 9-6 shows the available flow of 210 gpm for Pump 1 when delivering 144 feet of head.

Figure 9-6 – Pump 1 vs. MDD Requirement for Zone 3



The small pump can achieve the MDD requirement in Zone 3. The Zone 3 booster pump station is operated manually to replenish water in the Industry Hills Reservoirs. Water is utilized in Zone 3 during the day with supply from the Industry Hills Reservoirs, water is subsequently replenished as needed by the Zone 3 booster pump station. As a result, Zone 3 is only required to replenish one day of 39 gpm in an 8-hour period. This equates to 117 gpm flow. In light of this the existing booster pump can achieve the requirements for Zone 3. Fire flow to Zone 3 is always served by gravity through the Industry Hills Reservoirs.

9.4.4 Pressure Zone 4 Booster Capacity

There are two booster pumps in Zone 4. For redundancy, the capacity of one of the pumps is calculated and the sum of the two capacities is utilized to check that they are able to handle all demand conditions. Zone 4 is also served by the largest pump of the Zone 2 booster station. If pressure loss is experienced in Zone 4, a control valve on the discharge of this Zone 2 pump is opened to initiate production to serve fire flows in Zone 4.

The highest service elevation in Zone 4 is at 630 feet.

MDD + FF

To achieve 20 psi fire flow residual pressure at this location, the hydraulic gradient should be at least 676 feet:

$$630\ feet + \left(\frac{20\ lbs}{in^2}\right)\left(\frac{12\ in}{foot}\right)^2\left(\frac{ft^3}{62.4\ lbs}\right) \cong 676\ feet$$

Assuming water surface in Main Street Reservoir is 469 feet, Pump should add 207 feet of head:

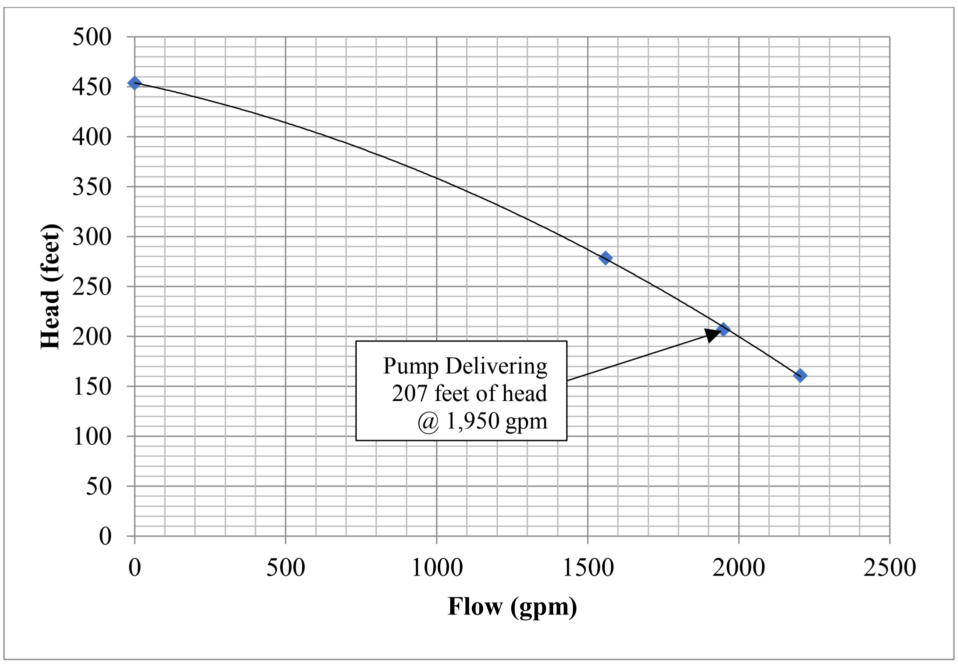
$$676\ feet - 469\ feet = 207\ feet$$

MDD plus fire flow in Zone 4 is 1,556gpm, (56 + 1,500) gpm.

Figure 9-7 shows the available flow of 1,950 gpm when Zone 2 Pump No. 2 is delivering 207 feet of head.

The Zone 2 Pump No. 2 can achieve the FF+MDD requirement in Zone 4. Note that Zone 4 piping has been configured with an interconnect to allow a redundant supply of water from the Industry Hills Reservoirs by way of the Industry Hills Booster Station No. 3 and San Jose pressure regulating stations to ensure that if pressure falls below a certain set point in Zone 2 this redundant supply would provide fire flow to Zone 4.

Figure 9-7 – Pump 2 vs. MDD + FF Requirement for Zone 4



PHD

To achieve 40 psi fire flow residual pressure at this location, the hydraulic gradient should be at least 633 feet:

$$630\ feet + \left(\frac{40\ lbs}{in^2}\right)\left(\frac{12\ in}{foot}\right)^2\left(\frac{ft^3}{62.4\ lbs}\right) \cong 723\ feet$$

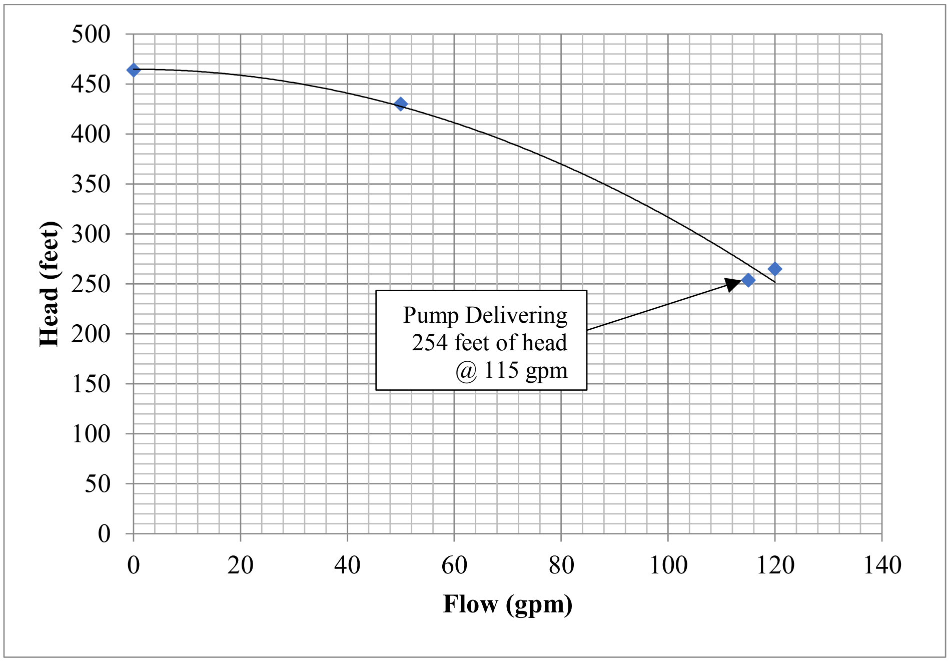
Assuming the water surface in the Main Street Reservoir is 469 feet, Pump should add 256 feet of head:

$$723\ feet - 469\ feet = 254\ feet$$

PHD in Zone 4 is 86 gpm.

Figure 9-8 shows the available flow of 115 gpm from one of the Zone 4 pumps while meeting 254 feet of head. One pump can achieve the PHD requirement in Zone 4.

Figure 9-8 – Zone 4 Booster Pump vs. PHD Requirement



9.5 Analysis of Existing Distribution System

The primary function of the distribution system is to carry supply to where it is needed. In most cases, fire flow demand is the governing factor in sizing pipelines. The results of a MDD plus Fire Flow analysis indicated a number of hydrants (or groups of hydrants) that could not meet the allocated fire flow capacity. These deficiencies have been categorized by the magnitude of the fire flow demand related to the following land uses:

Fire Flow Demand (gpm)	Land Use
1,250	Single Family Residential
3,000	Multi-family Residential, Commercial
4,000	Industrial and Institutional

Note that fire flow demands listed above are typical for the land uses indicated under the current standards provided by the Fire Marshal for new construction, land subdivision or water system upgrade. Fire flow requirements for individual parcels may be higher or lower than the listed demands at the discretion of the Fire Marshal. Allowances for reduced fire flow requirements include onsite fire sprinklers, use of fire retardant construction materials and sufficient separation between structures. The need for increased fire flow requirements may include multiple stories, large floor areas, high occupancy and high density.

A fire flow analysis means that a fire flow event was simulated at every hydrant location in the Water Model under MDD steady state conditions. The Water Model returned static pressure, residual pressure and available flow for each hydrant. The significant result is the available flow at 20 psi residuals which generally represents the performance the hydrant is capable of as a worst-case scenario. Exhibits were created and will be provided in **Appendix F** showing possible improvements that can rectify the following fire flow deficiencies in the future.

As permitted by regulation, fire flows in excess of 2,500 gpm may be met by up to two hydrants flowing simultaneously, and fire flows in excess of 3,500 gpm may be met by up to three hydrants flowing simultaneously. Any hydrant that could not individually meet the assigned fire flow requirement was retested using a multi-hydrant fire flow simulation.

9.5.1 Industrial Fire Flow Deficiency

Fire flow demand for industrial land use is set at 4,000 gpm.

Table 9-6 provides a list of hydrants grouped into areas that could not meet industrial fire flow requirements, prioritized by available flow at 20 psi residual pressure with up to three hydrants flowing simultaneously.

Table 9-6 – Industrial Fire Flow Deficiencies

Hydrant Location	Pressure Zone	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
5th Street, south of Workman Street	1	41	1,099	Existing Hydrant is off an existing 6-inch pipeline

The primary reason for this type of deficiency can be associated to undersized and/or dead-end mains serving the area. For this specific case, the fire hydrant is connected to a 6-inch main located on 5th Street in front of the Workman Elementary School and currently does not meet industrial/institution fire flow requirements. In addition, there is no other fire hydrant in the area to group within 300 feet. It is recommended to either upsize the existing 6-inch pipeline on 5th Street or install a new fire hydrant off the existing 16-inch pipeline on Main Street south of the elementary school.

9.5.2 Multi-Family Residential/Commercial Fire Flow Deficiencies

Fire flow demand for commercial land use is set at 3,000 gpm.

Table 9-7 provides a list of hydrants grouped into areas that could not meet multi-family residential or commercial fire flow requirements, prioritized by available flow at 20 psi residual pressure with up to two hydrants flowing simultaneously.

Table 9-7 – Commercial Fire Flow Deficiencies

Hydrant Location	Pressure Zone	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
923 N Hacienda Blvd	1	60	1,071	Recommend upsizing pipeline
892 N Hacienda Blvd	1	60	1,144	Recommend upsizing pipeline

The primary reason for this type of deficiency can be associated to undersized and/or dead-end mains serving the area. Due to the location of these deficiencies and the cost to implement a pipeline replacement solution, the proposed improvement should include an administrative and capital solution that consist of constructing a Fire Hydrant service from the existing SWS 12" water main on the opposite side of Hacienda to be located in front of the subject commercial use. In this manner, sufficient fire flow will be provided through use of grouping one of LPVCWD's existing fire hydrants with a new SWS hydrant to achieve the fire flow requirements. This improvement (CIP #13) will require coordination and approval from SWS.

9.5.3 Single Family Residential Fire Flow Deficiencies

Fire flow demand for single-family residential land use is set at 1,250 gpm.

Table 9-8 provides a list of hydrants that were unable to meet single family residential fire flow requirements, prioritized by available flow at 20 psi residual pressure.

Table 9-8 – Single Family Residential Fire Flow Deficiencies

Hydrant Location	Pressure Zone	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
Rexham Ave	1	47	953	Recommend upsizing pipeline or creating a hydraulic loop
Inyo St, East of Rexham Ave	1	47	1,247	Recommend upsizing pipeline or creating a hydraulic loop
Banbridge Ave and Rorimer St	1	45	637	Recommend upsizing pipeline or creating a hydraulic loop
Rorimer St, east of Waringwood Rd	1	42	824	Recommend upsizing pipeline or creating a hydraulic loop
Wegman Dr, east of Waringwood Rd	1	35	641	Recommend upsizing pipeline or creating a hydraulic loop
S Baja Ave, south of Inyo St	1	45	1,148	Recommend upsizing pipeline or creating a hydraulic loop
S Dial Ave, south of Inyo St	1	47	796	Recommend upsizing pipeline or creating a hydraulic loop
S Dalesford Dr, north of Inyo St	1	34	760	Recommend upsizing pipeline or creating a hydraulic loop
Bamboo St, north of Inyo St	1	34	786	Recommend upsizing pipeline or creating a hydraulic loop
S Appleblossom, north of Inyo St	1	36	1,241	Recommend upsizing pipeline or creating a hydraulic loop
693 Santo Oro Ave	1	59	698	Recommend upsizing pipeline or creating a hydraulic loop
674 Gaylawn Ct	1	59	709	Recommend upsizing pipeline or creating a hydraulic loop
15602 Temple Ave	1	56	728	Recommend upsizing pipeline or creating a hydraulic loop
16266 Bamboo St	2	145	1,222	Recommend upsizing pipeline
16342 Bamboo St	2	148	1,117	Recommend upsizing pipeline

The primary reason for this type of deficiency can be associated to undersized and/or dead-end mains serving the area. Most of these can be improved by creating hydraulic loops, upsizing existing pipelines and/or the addition of a pressure sustaining/regulating valve.

9.6 Proposed Improvements for Deficiencies

After discussing and receiving input from LPVCWD's staff, the following proposed improvements were created and analyzed to alleviate the fire flow deficiencies within LPVCWD's system.

9.6.1 5th Street and Workman Street (CIP#1)

Table 9-9 provides the updated findings of the industrial fire flow deficiency found in

Table 9-8 after incorporating a proposed improvement into the Water Model.

Table 9-9 – Industrial Fire Flow Deficiencies with Improvements

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
5th Street and NE corner of 5th Street and Main St	1	1	41 - 44	6,090	Fire Flow is sufficient by upsizing to an 8-inch main and installing 2 new fire hydrants

As shown in **Figure 9-9 (**also shown in **Exhibit 1** in **Appendix F**), it is recommended to upsize the existing 6-inch main (~510 feet) in 5th Street to an 8-inch main and install two new fire hydrants. One hydrant would be off the new upsized 8-inch main in 5th Street and installed in front of Workman Elementary School. The second fire hydrant would be off the existing 16-inch main on Main Street and installed at the northeast corner of 5th Street and Main Street. By running the hydrants simultaneously, the available fire flow would exceed 4,000 gpm.

Figure 9-9 –5th Street and Main Street Improvements (CIP#1)

9.6.2 Improvements on Ferrero Ln and Rorimer St (CIP#2)

Table 9-10 provides the updated findings of the single family residential fire flow deficiencies found in **Table 9-8** after incorporating proposed improvements into the Water Model.

Table 9-10 – Single Family Residential Fire Flow Deficiencies with Improvements on Ferrero Ln and Rorimer St

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
Rexham Ave	1	2	56	1,316	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize
Inyo St, East of Rexham Ave	1	2	56	2,037	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize
Banbridge Ave and Rorimer St	1	2	57	1,374	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize
Rorimer St, east of Waringwood Rd	1	2	54	1,820	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize
Wegman Dr, east of Waringwood Rd	1	2	57	1,620	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize

By upsizing the existing 4-inch pipeline to 6-inch along Rorimer St (~605 feet) east of Waringwood Road and installing a pressure sustaining/regulating valve on S Ferrero Lane, the hydraulic loop capacities increase within the area. All 4-inch wharf heads would be replaced by 6-inch fire hydrants. With these improvements, the fire hydrants within the area will be able to exceed the available fire flow requirement of 1,250 gpm as shown in **Figure 9-10** (also shown as **Exhibit 2** in **Appendix F**).

Figure 9-10 –Ferrero Lane and Rorimer Street Improvements (CIP#2)

9.6.3 Bamboo Street and Dalesford Drive Improvements (CIP#3)

Table 9-11 provides the updated findings of the single family residential fire flow deficiencies found in **Table 9-8** after incorporating proposed improvements into the Water Model.

Table 9-11 – Single Family Residential Fire Flow Deficiencies North of Inyo St

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
S Dalesford Dr, north of Inyo St	1	3	36	1,504	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize
Bamboo St, north of Inyo St	1	3	45	1,815	Fire Flow Available is sufficient with the installation of the PRV and waterline upsize

By upsizing the existing 6-inch pipeline to 8-inch along Dalesford Drive (~335 feet) north of Inyo Street and installing a pressure sustaining/regulating valve on Bamboo Street, the hydraulic loop capacities increase within the area. All 4-inch wharf heads would be replaced by 6-inch fire hydrants. With these improvements, the fire hydrants within the area will be able to exceed the available fire flow requirement of 1,250 gpm as shown in **Figure 9-11** (also shown as **Exhibit 3** in **Appendix F**).

Figure 9-11 – Bamboo Street and Dalesford Drive Improvements (CIP#3)

9.6.4 Improvements on Inyo St and Common Ave (CIP#4)

Table 9-12 provides the updated findings of the single family residential fire flow deficiencies found in **Table 9-8** after incorporating proposed improvements into the Water Model.

Table 9-12 – Single Family Residential Fire Flow Deficiencies Improvements on Inyo St and Common Ave

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
S Baja Ave, south of Inyo St	1	4	46	1,573	Fire Flow Available is sufficient by upsizing waterlines
S Dial Ave, south of Inyo St	1	4	48	1,415	Fire Flow Available is sufficient by upsizing waterlines
S Appleblossom, north of Inyo St	1	4	37	1,321	Fire Flow Available is sufficient by upsizing waterlines

By upsizing the existing 4-inch pipeline to 8-inch along Common Avenue (~835 feet) between Appleblossom Street and Central Avenue and in Inyo Street (~735 feet) from Common Ave going eastward to tie into the existing 8-inch, the hydraulic loop capacities increase within the area. All 4-inch wharf heads would also need to be replaced with 6-inch fire hydrants. With these improvements, the fire hydrants within the area will be able to exceed the available fire flow requirement of 1,250 gpm as shown in **Figure 9-12** (also shown as **Exhibit 4** in **Appendix F**).

Figure 9-12 – Inyo St and Common Ave Improvements (CIP#4)

9.6.5 Improvements on N Hacienda Blvd, North of Temple Ave (CIP#5)

Table 9-13 provides the updated findings of the single family residential fire flow deficiencies found in **Table 9-8** after incorporating proposed improvements into the Water Model.

Table 9-13 – Single Family Residential Fire Flow Deficiencies Improvements on N Hacienda Blvd, North of Temple Ave

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
693 Santo Oro Ave	1	5	60	2,253	Fire Flow Available is sufficient by creating a hydraulic loop
674 Gaylawn Ct	1	5	60	2,040	Fire Flow Available is sufficient by creating a hydraulic loop
15602 Temple Ave	1	5	57	1,878	Fire Flow Available is sufficient by creating a hydraulic loop

By adding an estimate of 550 feet of 8-inch pipeline in N Hacienda Blvd from Santa Oro Ave up towards Sierra Vista Ct, a hydraulic loop is formed. This hydraulic loop would increase the available fire flow within the streets of Santo Oro Ave, Temple Ave, and Gaylawn Rd thus exceeding the available fire flow requirement of 1,250 gpm per single hydrant as shown in **Figure 9-13** (also shown as **Exhibit 5** in **Appendix F**).

Figure 9-13 –N Hacienda Blvd, north of Temple Ave Improvement (CIP#5)

9.6.6 Improvements on Bamboo St (CIP#6)

Table 9-14 provides the updated findings of the single family residential fire flow deficiencies found in **Table 9-8** after incorporating proposed improvements into the Water Model.

Table 9-14 – Single Family Residential Fire Flow Deficiencies Improvements on Bamboo St

Hydrant Location	Pressure Zone	Exhibit No.	Static Pressure (psi)	Available Flow @ 20psi (gpm)	Comments
16266 Bamboo St	2	6	98	1,821	Fire Flow Available is sufficient by upsizing waterlines
16342 Bamboo St	2	6	101	1,340	Fire Flow Available is sufficient by upsizing waterlines

By upsizing the existing 6-inch pipeline along Bamboo Street (~ 1,555 feet) and Main Street (~160 feet) to 8-inch pipeline, the deficient fire hydrants will be able to reach the available fire flow requirement of 1,250 gpm as shown in **Figure 9-14** (also shown as **Exhibit 6** in **Appendix F**).

Figure 9-14 – Bamboo Street Improvements (CIP#6)

9.7 Evaluation Based on Condition and Age

All components of the distribution system have a finite service life. Individual components may wear out prematurely or outlive their recommended life cycle; however, for planning purposes average life cycles should be considered when budgeting replacement costs. Care should be taken to replace inefficient, worn or damaged infrastructure in a timely manner to avoid excessive repair costs and other vulnerabilities.

Table 9-15 provides a methodology for identifying and corroborating cyclical replacement. Prior to replacement (or maintenance as indicated), both criteria should be met. The interval criterion represents the age and the indication criterion represents condition. Any component exceeding its recommended age that also exhibits poor condition should be considered a string candidate for replacement.

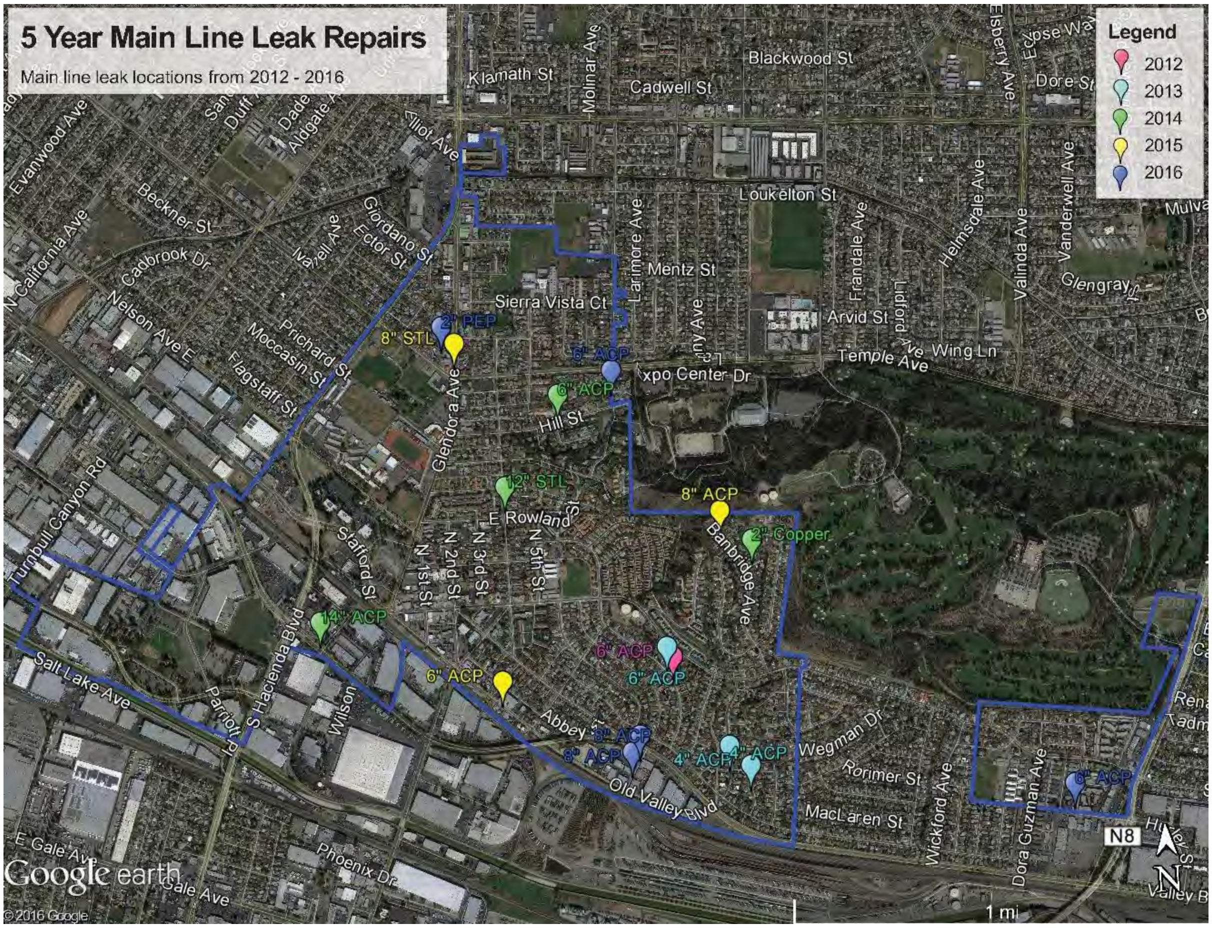
Table 9-15 – Infrastructure Replacement Criteria

Component	Interval (years)	Indication
Pipeline	AWWA	Frequent repair history, excessive energy losses
Pump/Motor Overhaul	15	Drop in efficiency below 65%
Pump/Motor Replacement	30	Frequent repair history, drop in efficiency
Control Valve Overhaul	25	Leaks, poor response, frequent repairs
Tank Recoating	20	Evidence of corrosion
Tank Replacement	80	Frequency/extent of repair history
Well Refurbishment/Replacement	50	Decline in effective capacity

9.7.1 Watermain Pipeline Evaluation based on Conditions

As stated above, all components of the distribution system have a finite service life and care should be taken to replace inefficient, worn or damaged infrastructure in a timely manner to avoid excessive repair costs and other vulnerabilities. Currently, the District has a procedure in place to document all leaks in a database for purposes of keeping adequate records and for the benefit of data analysis. Analyzing a 5-year data sample, **Figure 9-15** provides an overview assessment of current conditions of watermains in the distribution system.

Figure 9-15 – Watermain Leak Repairs (2012-2016)



9.7.1.1 Watermain Pipeline Condition Recommendations

Based on the data observed on **Figure 9-15**, the data plotted shows no indication of areas with hot spots or a specific trend in a single water main that has multiple leaks. As a result, there is no recommendation to add a watermain(s) to the list of proposed Capital Improvements based on condition alone.

9.7.2 Service Line Evaluation Based on Conditions

As previously mentioned, the District has a procedure in place to document all leaks in a database for purposes of keeping adequate records and for the benefit of data analysis. Analyzing a 5-year data sample, **Table 9-16** provides an overview assessment of service line repairs and service line replacements performed in the distribution system.

Table 9-16 – Service Line Leak Repairs and Replacements (2012-2016)

SERVICE LINE REPAIRS						
Type	**2012**	**2013**	**2014**	**2015**	**2016**	**5 Yr Total**
Copper	1	4	7	1	4	17
Galvanized	1	0	0	0	0	1
PEP	0	2	1	2	1	6
Totals	2	6	8	3	5	24
SERVICE LINE REPLACEMENTS						
Type	**2012**	**2013**	**2014**	**2015**	**2016**	**5 Yr Total**
Copper	0	0	2	2	6	10
Galvanized	9	6	5	2	0	22
PEP	10	15	20	17	15	77
Totals	19	21	27	21	21	109

9.7.2.1 Service Line Condition Recommendations (CIP#7)

Based on the data observed on **Table 9-16**, the data listed identifies that galvanized and PEP service lines fail more commonly and need replacement. In addition, analysis of this data also identified two hot spot leak areas in the District. The first area of concern is a single 2” service that is approximately 250 ft. in length and composed of a combination of PEP and Galvanized pipe. The service has had repeated leaks on different areas of the service. In addition, senior personnel have also commented on additional leak repairs on this service line prior to 2012. As a result, it is recommended that the 2” service line located west of the intersection of Glendora Ave. and Temple Ave. be replaced with a 2” Copper service line as shown in **Figure 9-16**.

The second area of concern is a group of leaks located on Main Street. However, after reviewing service line replacement records and gathering input from senior personnel, it was previously identified that a group of service lines feeding a tract of condos in this area posed repeated leaks. As a result, the District initiated a service replacement program to replace all the PEP services feeding these condos with copper services.

Figure 9-16 – Proposed 2" Copper Service Line on Temple Ave. and Glendora Ave

9.7.3 Watermain Pipeline Replacement Based on Age

In 2012, the American Water Works Association (AWWA) published a report on water pipeline replacement called Buried No Longer: Confronting America's Water Infrastructure Challenge. The report suggests that Asbestos-Cement (AC) and Ductile Iron (DI) pipe in the western United States has average service life of 75 and 110 years. Statistically speaking, this means half of all ACP and DIP last longer than 75 and 110 years and half are replaced before those ages. The largest portion of pipe materials used in the LPVCWD system is ACP (66.3%) and DIP (7.2%).

This implies that once the LPVCWD distribution system is mature, an average of 6,800 feet of ACP and 1,300 feet of DIP replacement should be scheduled per year (or 68,000 feet and 13,000 feet over a 10-year period):

However, the LPVCWD distribution system is a comparatively young system and no pipelines are more than 75 and 110-years.

It is estimated LPVCWD's distribution system will reach maturity in 18 years for ACP and 42 years for DIP, at which time a regular and vigorous replacement program should be implemented.

Until then, a more moderate pipeline replacement program is recommended. Consider the following:

- No plan to replace DIP
- No pipe age and condition issues in 2016
- Distribution system maturity will occur in 18 years (i.e. 2034), at which time a replacement schedule of 6,800 feet per year is required indefinitely.
- Using a straight-line projection, LPVCWD should consider a pipe replacement that starts at zero in 2016 and increases by 380 feet per year until 2034:

$$\frac{6{,}800\ feet\ per\ year}{2034 - 2016} \cong 380\ feet\ per\ year$$

Over the next ten years, this approach implies replacement of 17,100 feet of pipe, as shown in **Table 9-17**.

Table 9-17 – Near Term Pipeline Replacement Schedule

Year	Feet of Pipe per Year
2016	0
2017	380
2018	760
2019	1,140
2020	1,520
2021	1,900
2022	2,280
2023	2,660
2024	3,040
2025	3,420
Total for Ten years	17,100

According to records, LPVCWD distribution system's oldest pipe age is 1948. At the estimated year of 2034 when the system would reach maturity, the age of pipelines younger than 1959 would reach its service life and need to be replaced.

By creating queries within the computer model and running simulations, it was determined that approximately over 13,000 feet of pipeline of the age of 1959 or earlier exist in the system. These pipelines are located in LPVCWD's Pressure Zone 1 and Pressure Zone 2. **Figure 9-17** shows the pipelines of the age 1948 located in Pressure Zone 2.

Figure 9-17 - Pipelines of the Age of 1948 (CIP#8)

There is approximately 1,140 feet in Pressure Zone 2 of 6-inch pipelines of the age of 1948 that would need to be replaced by the year 2034. The majority of the pipelines to be replaced are located on San Jose Avenue, west of N. Del Valle Avenue. There is a small portion of pipe installed in 1948 east of Holguin Place that would also need to be replaced.

Figure 9-18 shows the pipelines of age 1959 located in Pressure Zone 1.

Figure 9-18 – Pipelines of the Age of 1959 (CIP#9)

There is approximately 11,950 feet in Pressure Zone 1 of pipelines of the age of 1959 ranging from 4-inch to 12-inch that would need to be replaced by the year 2034. As shown, the pipelines that would need replacement are enclosed by Old Valley Blvd on the south, Central Ave on the north, 1st Street on the west and Abbey Street on the east.

9.7.4 Pump Maintenance based on Age

There are 3 existing Well pumps and 14 existing booster pumps for a total of 17 pumps. In a 30-year cycle, a pump should be overhauled once and replaced once.

Therefore, over a typical 10-year period, there should be an allocation for 6 pump overhauls and 6 pump replacement.

$$\left(\frac{17\ pumps}{30\ year\ cycle}\right)(10\ years) \cong 6\ pumps\ per\ 10\ year\ period$$

9.7.5 Pump Maintenance based on Condition

Based on SCE pump efficiency testing, all pumps below the 65% efficiency rating threshold should be considered for overhaul or replacement. **Table 9-18** lists the current ratings of the pumps which are candidates for repair of replacement.

Table 9-18 – Pumps According to Efficiency Rating

Pump Name	Eff. (%)
LP Treatment Plant No. 1	43.1
LP Treatment Plant No. 2	45.6
Well No. 3	53.1
Pressure Zone 2 No. 1	55.5
Hudson No. 2	59.3
Well No. 5	60.4

There are no SCE pump efficiency testing results for 6 out of 17 pumps in the LPVCWD system. According to the table above, there are 6 pumps that require an overhaul. Well No. 5 replacement is considered as a capital improvement per CIP #10. The Hudson booster pump No. 2 is proposed to be replaced per CIP#11 as described in Section 9.8. The remaining 4 pumps listed above require efficiency overhauls and 5 existing pumps currently exhibit efficiencies meeting the design criteria. The remaining 6 pumps that have not been tested are new pumps having been installed within the last 5 years. It is not anticipated that these new pumps will require replacement or refurbishment in the next 10 years. In light of this, it is expected that 4 pumps will require replacement and 5 pumps will require refurbishment over the next 10-year cycle.

9.7.6 Control Valve Overhaul Based on Age

Control Valves should be scheduled for overhaul on a 25-year cycle. There are 4 existing control valves, as shown in **Table 9-19**.

$$\left(\frac{4\ controal\ valves}{25\ year\ cycle}\right)(10\ years) \cong 2\ control\ valves\ per\ 10\ year\ period$$

Table 9-19 – Active Control Valves

No.	Location	Size (inches)
1	Zone 4	6
2	Zone 2	8
3	Zone 5	4
4	Zone 2	10

9.7.7 Tank Recoating's Based on Age

When exposed to the environment, steel oxidizes and deteriorates. For steel water tanks, paints and other protective coatings are used on both the interior and exterior to prevent such deterioration. LPVCWD has a 20-year interval period for tank recoating(s), however if there is an indication of severe corrosion or an immediate recommendation for re-coating on a wet inspection report, the tank will be re-coated as needed. Both the interior and exterior coatings must be carefully selected to provide the best protection based on coating life and effectiveness of protection.

LPVCWD considers the following factors when selecting an exterior coating:

- The type of atmosphere in which the tank is located
- The area surrounding the tank
- The expected ambient temperatures and prevailing winds during the time of year when
- the coating project is scheduled to be performed
- Appearance of the coating
- AWWA Standard D-102 Coating Steel Water Storage Tanks
- ANSI/NSF Standard 61

Interior tank coatings must be able to withstand the following:

- Constant immersion in water
- Varying water temperatures
- Alternate wetting and drying periods
- High humidity and heat in the zones above the high-water level
- Chlorine and mineral content of the water

In addition, the interior coatings must not impose a health risk on the general public and must be approved for potable water storage by the CA SWRCB.

$$\left(\frac{3\ tanks}{20\ year\ cycle}\right)(10\ years) \cong 2\ tank\ recoatings\ per\ 10\ year\ period$$

9.7.8 Tank Replacement Based on Age

On an 80-year replacement cycle, none of the three LPVCWD tanks is scheduled for replacement within the next ten years.

9.7.9 Well Refurbishment or Replacement Based on Age

On a 50-year refurbishment/replacement cycle, two LPVCWD Wells (Well No. 3 and 5) exceed or will exceed their recommended life cycle during the next ten years in terms of age. Well No. 2 will be 50 years in 2027 and will need to be refurbished or replaced at that time.

9.8 Capital Improvement Program

The Capital Improvement Program (CIP) is a set of projects recommended to be implemented within the next ten years. Individual projects are given relative priority based on perceived urgency. Projects have been separated as Capital Projects and Maintenance Projects to be consistent with LPVCWD's budgeting allocations.

9.8.1 Cost Assumptions

Estimates for capital project are based on the cost assumptions provided in **Table 9-20**.

Table 9-20 – Unit Cost Assumptions

Category	Item	Unit Cost	Unit
Storage	New Storage	2	$/gallon
	Recoating	15	$/sf
Pumps	New Pump	150,000	$/pump
	Pump Replacement	75,000	$/pump
	Pump Refurbishment	15,000	$/pump
Control Valves	New Valve	50,000	$/valve
	Valve Overhaul	15,000	$/valve
Distribution	New Pipes	17.5	$/in/ft

The total cost of a capital project is the summation of the unit costs plus costs associated with design and administration. These costs are 25% of construction costs for engineering and administration and 10% of construction costs for contingencies.

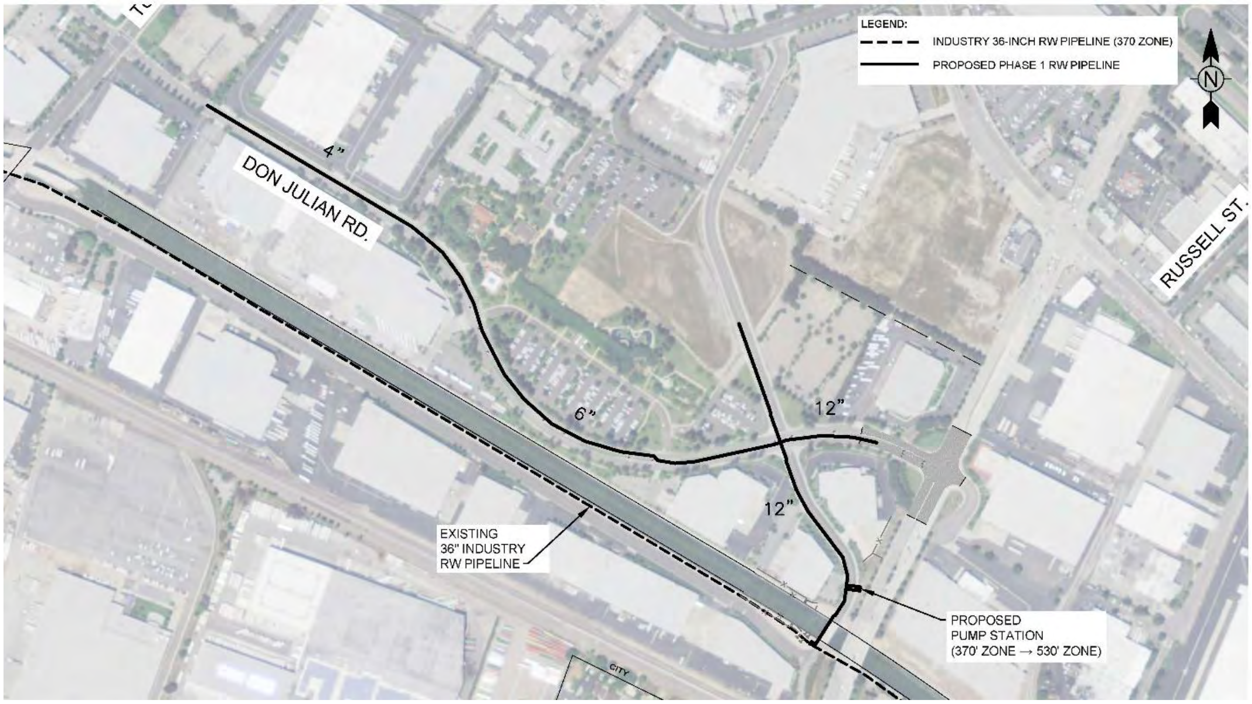
9.8.2 Capital Projects

The capital projects listed in this section consider a 10-year planning horizon. Relative priority for individual projects or groups of projects is provided. Prioritization is not meant to be rigid, rather to assist with scheduling and implementation. It is recommended to corroborate conditions in the field with operations prior to implementation.

9.8.2.1 Phase 1 Recycled Water System (CIP#10)

As previously mentioned, the Districts Recycled Water Project design utilizes the City of Industry's 36-inch recycled water transmission line as the source of supply for the system. The District has partnered with Upper San Gabriel Valley Municipal Water District to secure a $428,000 grant from the State Department of Water Resources for Phase 1 of the Recycled Water System Project. This grant will cover approximately 25 percent of the estimated cost of Phase 1, which is expected to serve 50 acre feet of recycled water per year to irrigation customers on Don Julian Avenue as shown in **Figure 9-19**.

Figure 9-19 – Phase 1 Recycled Water Project (CIP#10)



9.8.2.2 Well 5 Rehab and Sound Structure Improvement (CIP#11)

The District has identified that Well 5's efficiency is nearly at 60% and will required rehab. During these activities, it would be much more feasible and cost effective to install a sound attenuating structure to properly address noise complaints.

9.8.2.3 Hudson Avenue Pumping Improvements (CIP#12)

Given the current layout of the Hudson Booster Station, the District plans to Replace/Rehab pumps, install VFDs and upgrade discharge piping for increased efficiency purposes. The improvement would consist of maintaining 2 pumps with each having a maximum pumping rate of 1,500 gpm, but with Best Efficiency Pumping rates at 1,000 gpm. The envisioned range of pumping would be 700 to 1,500 for these two pumps.

The third pump is envisioned to range from 600 to 1,000 gpm. In addition, the installation of mag meter at the plant effluent and testing taps would also be included in the improvement to ensure proper efficiency testing of each pump.

9.8.2.4 923 and 892 N Hacienda Blvd Commercial Flow Deficiencies (CIP #13)

As stated before, due to the location of these deficiencies and the cost to implement a pipeline replacement solution, the proposed improvement would include an administrative and capital solution that consist of constructing a Fire Hydrant service from the existing SWS 12" water main on the opposite side of Hacienda to be located in front of the subject commercial use. In this manner, sufficient fire flow will be provided through use of grouping one of LPVCWD's existing fire hydrants with a new SWS hydrant to achieve the fire flow requirements

9.8.2.5 Estimated Capital Project Cost's

Based on the Capital Project's identified in this section, **Table 9-21** summarized the estimated cost for each project.

Table 9-21 – Capital Projects ($1,000s)

CIP #	Category	Project	Priority	Justification	Size (in)	Length (ft)	Constr.	Engr. & Admin. (25%)	Cont. (10%)	Total
1	Fire Flow	Pipeline Improvements in 5th Street and Fire Hydrants	High	Fire flow deficiency (School)	8	510	87	22	9	**118**
2	Fire Flow	Valve and Pipeline Improvements in Rorimer	Medium	Fire flow deficiency (Residential)	6	605	150	37	15	**202**
3	Fire Flow	Bamboo Street and Dalesford Drive Improvements	Medium	Fire flow deficiency (Residential)	8	335	182	46	19	**247**
4	Fire Flow	Pipeline Improvements in Inyo and Common and Fire Hydrants	Medium	Fire flow deficiency (Residential)	8	1,570	243	61	25	**329**
5	Fire Flow	Pipeline Improvements in Hacienda	Medium	Fire flow deficiency (Residential)	8	550	88	22	9	**119**
6	Fire Flow	Pipeline Improvements in Main	Medium	Fire flow deficiency (Residential	8	1,000	140	35	14	**189**
7	Condition	Service Line Replacement	Medium	Recurring Leaks			8	-	1	**9**
8	Condition	San Jose Waterline Replacement	Low	Replace aging waterline	6	1,140	120	30	12	**162**

CIP #	Category	Project	Priority	Justification	Size (in)	Length (ft)	Constr.	Engr. & Admin. (25%)	Cont. (10%)	Total
9	Condition	Old Valley Blvd General Waterline Replacements	Low	Replace aging waterline	8	10,450	1,463	366	147	**1,976**
10	Improvement	Phase 1 Recycled Water System	High	Reduce dependence of imported water supply			1600	400	200	**2200**
11	Supply	Well 5 Rehab and Sound Structure Improvement	Medium	Sound and Efficiency Issues			100	25	10	**135**
12	Booster Station	Hudson Avenue Pumping Improvements	Medium	Efficiency and Layout Improvements			600	150	60	**810**
13	Fire Flow	Collaborate with SWS for installation of a Fire Hydrant on Hacienda	Medium	Fire flow deficiency (Commercial)			10	3	1	**14**
Total										**6,510**

9.8.3 Maintenance Projects

The projects identified in this section consider field observations noted during field operations along with cyclical maintenance projects on a 10-year planning horizon. Relative priority for individual projects or groups of projects is provided. Prioritization is not meant to be rigid, rather to assist with scheduling and implementation. It is recommended to corroborate conditions in the field with operations prior to implementation.

9.8.3.1 Aging Galvanized Pipe and Polyethylene Pipe (PEP) Service Line Replacements

The District identified that aging galvanized and polyethylene pipe service lines pose problems with service leaks. As a result, the District created an ongoing program to replaced galvanized and polyethylene service lines with copper service lines. The District' program consist of replacing the service lines that meet this criterion when leaks are discovered on any part of the service line. In review of the District's 5-year leak repair history, almost all service line leaks are from 1" PEP or galvanized pipe with very few from copper pipe. In some cases, it was also identified that the service saddle was of cast iron material that showed heavy signs of corrosion. As a result, these identified saddles were also replaced when the service lines were replaced. Over the last 5 years the District Field Crews have replaced 109 service lines. This program shall continue over the next five-year period at a pace of approximately 20 service line replacements a year.

9.8.3.2 Aging Cast Iron Service Saddle Replacements

The District has experienced a few leaks on Leverett Avenue and Dora Guzman Avenue that caused substantial damage to the public street and required emergency shut-downs that resulted in customers being without water for several hours. Based on the data gathered during service line leak repairs on these streets, staff identified that all services were installed using cast-iron saddles on Leverett Avenue and Dora Guzman Avenue. Given the high probability of leaks on these types of saddles due to corrosion, the District plans to replace the remaining cast iron service saddles on Leverett Avenue and Dora Guzman Avenue with bronze double strapped saddles. It is estimated that there are approximately 20 cast iron service saddles that will require replacement.

9.8.3.3 Valve Replacements

During valve maintenance activities, District staff takes note of valves that pose difficulty in operating or of being non-operative at all. The average rate of replacement should be roughly 10 valves per year, primarily in areas where pipeline replacements are at least five years or more into the future.

9.8.3.4 Tank Recoating's

As stated in section 9.6.4, paints and other protective coatings are used on both the interior and exterior of steel tanks to prevent such deterioration. Based on the District's tank cyclical maintenance, the 3.0 MG and 1.8 MG tanks on Main St. will need to be recoated.

9.8.3.5 Estimated Maintenance Project Cost

Based on the Maintenance Projects identified in this section, **Table 9-22** summarized the estimated cost for each project over the upcoming 10-year period.

Table 9-22 – 10 Year Maintenance Projects ($1,000s)

Category	Project	Priority	Justification	Constr.	Engr.	Cont. (10%)	Total
Boosters	4 Pump Overhauls	Medium	Booster Cyclical Maintenance	60	0	6	**66**
	5 Pump Replacements	Medium	Booster Cyclical Maintenance	375	0	38	**413**
Control Valves	2 Control Valve Overhauls	Medium	Valve Cyclical Maintenance	30	0	3	**33**
System Valves	100 System Valve Replacements	Medium	Valve Cyclical Replacment	1000	0	100	**1100**
Service Laterals and Saddles	101 Service Lateral Replacements	Medium	Valve Cyclical Replacment	250		25	**275**
Storage	Main Street Tank Recoating's	Medium	Tank Cyclical Maintenance	720	180	72	**972**
Total							**2859**

APPENDIX A

Water Master Judgement

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SUPERIOR COURT OF THE STATE OF CALIFORNIA

FOR THE COUNTY OF LOS ANGELES

Upper San Gabriel Valley Municipal Water District, Plaintiff, vs. City of Alhambra, et al, Defendants	Case No.: 924128 **AMENDED JUDGMENT** (And Exhibits Thereto)

HONORABLE MAUREEN DUFFY-LEWIS

Assigned Judge Presiding

DEPARTMENT 38

June 21, 2012

(This version includes prior Amendments

and updated Exhibits through June 21, 2012.)

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And
Amended Judgment Sections
Identified With Prior Judgment Section Numbers

EXHIBITS

"A" – Map entitled, "San Gabriel River Watershed Tributary to Whittier Narrows"

"B" – Boundaries of Relevant Watershed

"C" – Table Showing Base Annual Diversion Rights of Certain Diverters

"D" – Table Showing Prescriptive Pumping Rights and Pumper's Share of Each Pumper

"E" – Table Showing Production Rights of Each Integrated Producer

"F" – Table Showing Special Category Rights

"G" – Table Showing Non-consumptive Users

"H" – Watermaster Operating Criteria

"J" – Puente Narrows Agreement

"K" – Overlying Rights

(Exhibit "K" Includes - Nature of Overlying Right, Description of Overlying Lands To Which Overlying Rights Are Appurtenant, Producers Entitled To Exercise Overlying Rights and Their Respective Consumptive Use Portions, and Map of Overlying Lands.)

"L" – List of Producers and Other Parties and Their Designees (June 2012) (New)

"M" – Watermaster Members, Officers, and Staff, Including Calendar Year 2012 (New)

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SUPERIOR COURT OF CALIFORNIA, COUNTY OF LOS ANGELES

Upper San Gabriel Valley Municipal Water District, Plaintiff, vs. City of Alhambra, et al, Defendant	Case No.: 924128 **AMENDED JUDGMENT** Hearing: June 21, 2012 Department 38, 9:30 A.M.

The Petition of the MAIN SAN GABRIEL BASIN WATERMASTER for this AMENDED JUDGMENT herein, came on regularly for hearing in this Court before the **HONORABLE MAUREEN DUFFY-LEWIS**, ASSIGNED JUDGE PRESIDING, on June 21, 2012; Frederic A. Fudacz appeared as attorney for Watermaster - Petitioner; and good cause appearing, the following **ORDER** and **AMENDED JUDGMENT** are, hereby, made:

I. INTRODUCTION

1. Pleadings, Parties, and Jurisdiction. The complaint herein was filed on January 2, 1968, seeking an adjudication of water rights. By amendment of said complaint and dismissals of certain parties, said adjudication was limited to the Main San Gabriel Basin and its Relevant Watershed. Substantially all defendants and the cross-defendant have appeared herein, certain defaults have been entered, and other defendants dismissed. By the pleadings herein and by

Order of this Court, the issues have been made those of a full inter se adjudication of water rights as between each and all of the parties. This Court has jurisdiction of the subject matter of this action and of the parties herein.

2. Stipulation for Entry of Judgment. A substantial majority of the parties, by number and by quantity of rights herein Adjudicated, Stipulated for entry of a Judgment in substantially the form of the original Judgment herein.

3. Lis Pendens. (New) A Lis Pendens was recorded August 20, 1970, as Document 2650, in Official Records of Los Angeles County, California, in Book M 3554, Page 866.

4. Findings and Conclusions. (Prior Judgment Section 3) Trial was had before the Court, sitting without a jury, John Shea, Judge Presiding, commencing on October 30, 1972, and Findings of Fact and Conclusions of Law have been entered herein.

5. Judgment. (New) Judgment (and Exhibits Thereto), Findings of Fact and Conclusions of Law (and Exhibits Thereto), Order Appointing Watermaster, and Initial Watermaster Order were signed and filed December 29, 1972, and Judgment was entered January 4, 1973, in Book 6791, Page 197.

6. Intervention After Judgment. (New) Certain defendants have, pursuant to the Judgment herein and the Court's continuing jurisdiction, intervened and appeared herein after entry of Judgment.

7. Amendments of Judgment. (New) The original Judgment herein was previously amended on March 29 1979, by: (1) adding definition (r [1]) thereto, (2) amending definition (bb) therein, (3) adding Exhibit "K" thereto, (4) adding Sections 14.5 and 16.5 thereto, and (5) amending Sections 37(b), 37(c), 37(d), and Section 47 therein; it was again amended on December 21, 1979, by amending Section 38(c) thereof; again amended on February 21, 1980, by amending Section 24 thereof; again amended on September 12, 1980, by amending Sections 35(a), 37(a), and 38(a); again amended on December 22, 1987, by adding Section 37(e) thereto; amended again on July 22, 1988 by amending Section 37(e) thereof and Ordering an Amended Judgment herein; again amended on January 29, 1991, by amending Sections 10(j), 40, and by adding Sections 40(a), 40(b), 40(c), 40(d), 40(e) and 40(f); again amended on April 2, 1991, by

amending Sections 10(ff), 10(jj), and 34(h); again amended on February 24, 1992, by amending Section 40(b); again amending Appendices in 2000; and again on June 21, 2012 by amending Sections 10(ff), 26, 29(d), 34(b), 34(c), 34(g), 34(h), 34(j), 36, 42, 44, 45, 46(a), 47, 50, 54, Exhibit H Sections 2, 3(d), 4; adding Sections 34(p), 34(q), 34(r); and deleting Section 53 entirely.

8. Transfers. (New) Since the entry of Judgment herein there have been numerous transfers of Adjudicated water rights. To the date hereof, said transfers are reflected in Exhibits "C", "D", and "E".

9. Producers and Their Designees. (New) The current status of Producers and their Designees is shown on Exhibit "L".

10. Definitions. (Prior Judgment Section 4) As used in this Judgment, the following terms shall have the meanings herein set forth:

(a) Base Annual Diversion Right – The average annual quantity of water which a Diverter is herein found to have the right to Divert for Direct Use.

(b) Direct Use – Beneficial use of water other than for spreading or Ground Water recharge.

(c) Divert or Diverting – To take waters of any surface stream within the Relevant Watershed.

(d) Diverter – Any party who Diverts.

(e) Elevation – Feet above mean sea level.

(f) Fiscal Year – A period July 1 through June 30, following.

g) Ground Water – Water beneath the surface of the ground and within the zone of saturation.

(h) Ground Water Basin – An interconnected permeable geologic formation capable of storing a substantial Ground Water supply.

(i) Integrated Producer – Any party that is both a Pumper and a Diverter, and has elected to have its rights adjudicated under the optional formula provided in Section 18 of this Judgment.

(j) In-Lieu Water Cost – The differential between a particular Producer's cost of Watermaster directed produced, treated, blended, substituted, or Supplemental Water delivered or substituted to, for, or taken by, such Producer in-lieu of his cost of otherwise normally Producing a like amount of Ground Water from the Basin. (Amended 1/29/91)

(k) Key Well – Baldwin Park Key Well, being elsewhere designated as State Well No. 1S/10W-7R2, or Los Angeles County Flood Control District Well No. 3030-F. Said well has a ground surface Elevation of 386.7.

(l) Long Beach Case – Los Angeles Superior Court Civil Action No. 722647, entitled, "Long Beach, et al., v. San Gabriel Valley Water Company, et al."

(m) Main San Gabriel Basin or Basin – The Ground Water Basin underlying the area shown as such on Exhibit "A".

(n) Make-Up Obligation – The total cost of meeting the obligation of the Basin to the area at or below Whittier Narrows, pursuant to the Judgment in the Long Beach Case.

(o) Minimal Producer – Any party whose Production in any Fiscal Year does not exceed five (5) acre-feet. (Prior to June 21, 2012)

(p) Natural Safe Yield – The quantity of natural water supply which can be extracted annually from the Basin under conditions of long term average annual supply, net of the requirement to meet downstream rights as determined in the Long Beach Case (exclusive of Pumped export), and under cultural conditions as of a particular year.

(q) Operating Safe Yield – The quantity of water which the Watermaster determines hereunder may be Pumped from the Basin in a particular Fiscal Year, free of the Replacement Water Assessment under the Physical Solution herein.

(r) Overdraft – A condition wherein the total annual Production from the Basin exceeds the Natural Safe Yield thereof.

(s) Overlying Rights – (Prior Judgment Section 4(r)[1]) The right to Produce water from the Basin for use on Overlying Lands, which rights are exercisable only on specifically defined Overlying Lands and which cannot be separately conveyed or transferred apart therefrom.

(t) Physical Solution – (Prior Judgment Section 4(s)) The Court decreed method of managing the waters of the Basin so as to achieve the maximum utilization of the Basin and its water supply, consistent with the rights herein declared.

(u) Prescriptive Pumping Right – (Prior Judgment Section 4(t)) The highest continuous extractions of water by a Pumper from the Basin for beneficial use in any five (5) consecutive years after commencement of Overdraft and prior to filing of this action, as to which there has been no cessation of use by that Pumper during any subsequent period of five (5) consecutive years, prior to the said filing of this action.

(v) Produce or Producing – (Prior Judgment Section 4(u)) To Pump or Divert Water.

(w) Producer – (Prior Judgment Section 4(v)) A party who Produces water.

(x) Production – (Prior Judgment Section 4(w)) The annual quantity of water Produced, stated in acre feet.

(y) Pump or Pumping – (Prior Judgment Section 4(x)) To extract Ground Water from the Basin by Pumping or any other method.

(z) Pumper – (Prior Judgment Section 4(y)) Any party who Pumps water.

(aa) Pumper's Share – (Prior Judgment Section 4(z)) A Pumper's right to a percentage of the entire Natural Safe Yield, Operating Safe Yield and appurtenant Ground Water storage.

(bb) Relevant Watershed – (Prior Judgment Section 4(aa)) That portion of the San Gabriel River watershed tributary to Whittier Narrows which is shown as such on Exhibit "A", and the exterior boundaries of which are described in Exhibit "B".

(cc) Replacement Water – (Prior Judgment Section 4(bb)) Water purchased by Watermaster to replace: (1) Production in excess of a Pumper's Share of Operating Safe Yield; (2) The consumptive use portion resulting from the exercise of an Overlying Right; and (3) Production in excess of a Diverter's right to Divert for Direct Use.

(dd) Responsible Agency – (Prior Judgment Section 4(cc)) The municipal water district which is the normal and appropriate source from whom Watermaster shall purchase Supplemental Water for replacement purposes under the Physical Solution, being one of the following:

(1) Upper District – Upper San Gabriel Valley Municipal Water District, a member public agency of the Metropolitan Water District of Southern California (MWD).

(2) San Gabriel District – San Gabriel Valley Municipal Water District, which has a direct contract with the State of California for State Project Water.

(3) Three Valleys District – Three Valleys Municipal Water District, formerly, "Pomona Valley Municipal Water District", a member public agency of MWD.

(ee) Stored Water – (Prior Judgment Section 4(dd)) Supplemental Water stored in the Basin pursuant to a contract with Watermaster as authorized by Section 34(n).

(ff) Supplemental Water – (Prior Judgment Section 4(ee)) Nontributary water imported through a Responsible Agency and reclaimed water or water obtained from other available sources when water is not available in a timely fashion from a Responsible Agency. (Amended 6/21/12)

(gg) Transporting Parties – (Prior Judgment Section 4(ff)) Any party presently transporting water (i.e., during the 12 months immediately preceding the making of the findings herein) from the Relevant Watershed or Basin to an area outside thereof, and any party presently or hereafter having an interest in lands or having a service area outside the Basin or Relevant Watershed contiguous to lands in which it has an interest or a service area within the Basin or Relevant Watershed. Division by a road, highway, or easement shall not interrupt contiguity. Said term shall also include the City of Sierra Madre, or any party supplying water thereto, so long as the corporate limits of said City are included within one of the Responsible Agencies and if said City, in order to supply water to its corporate area from the Basin, becomes a party to this action bound by this Judgment.

(hh) Water Level – (Prior Judgment Section 4(gg)) The measured Elevation of water in the Key Well, corrected for any temporary effects of mounding caused by replenishment or local depressions caused by Pumping.

(ii) Year – (Prior Judgment Section 4(hh)) A calendar year, unless the context clearly indicates a contrary meaning.

(jj) Reclaimed Water – Water which, as a result of treatment of waste, is suitable for a direct beneficial use or a controlled use that would not otherwise occur. (Amended 4/2/91)

11. Exhibits. (Prior Judgment Section 5) The following exhibits are attached to this Judgment and incorporated herein by this reference:

Exhibit "A" – Map entitled, "San Gabriel River Watershed Tributary to Whittier Narrows", showing the boundaries and relevant geologic and hydrologic features in the portion of the watershed of the San Gabriel River lying upstream from Whittier Narrows.

Exhibit "B" – Boundaries of Relevant Watershed.

Exhibit "C" – Table Showing Base Annual Diversion Rights of Certain Diverters.

Exhibit "D" – Table Showing Prescriptive Pumping Rights and Pumper's Share of Each Pumper.

Exhibit "E" – Table Showing Production Rights of Each Integrated Producer.

Exhibit "F" – Table Showing Special Category Rights.

Exhibit "G" – Table Showing Non-consumptive Users.

Exhibit "H" – Watermaster Operating Criteria.

Exhibit "J" – Puente Narrows Agreement.

Exhibit "K" – Overlying Rights, Nature of Overlying Right, Description of Overlying Lands to which Overlying Rights are Appurtenant, Producers Entitled to Exercise Overlying Rights and their Respective Consumptive Use Portions, and Map of Overlying Lands.

Exhibit "L" – (New) List of Producers And Their Designees, as of June 2012.

Exhibit "M" – (New) Watermaster Members, Officers and Staff, Including

Calendar Year 2012.

II. DECREE

NOW, THEREFORE, IT IS HEREBY DECLARED, ORDERED, ADJUDGED AND DECREED:

A. DECLARATION OF HYDROLOGIC CONDITIONS

12. Basin as Common Source of Supply. (Prior Judgment Section 6) The area shown on Exhibit "A" as Main San Gabriel Basin overlies a Ground Water basin. The Relevant Watershed is the watershed area within which rights are herein adjudicated. The waters of the Basin and Relevant Watershed constitute a common source of natural water supply to the parties herein.

13. Determination of Natural Safe Yield. (Prior Judgment Section 7) The Natural Safe Yield of the Main San Gabriel Basin is found and declared to be one hundred fifty-two thousand seven-hundred (152,700) acre-feet under Calendar Year 1967 cultural conditions.

14. Existence of Overdraft. (Prior Judgment Section 8) In each and every Calendar year commencing with 1953, the Basin has been and is in Overdraft.

B. DECLARATION OF RIGHTS

15. Prescription. (Prior Judgment Section 9) The use of water by each and all parties and their predecessors in interest has an open, notorious, hostile, adverse, under claim of right, and with notice of said overdraft continuously from January 1, 1953 to January 4, 1973. The rights of each party herein declared are prescriptive in nature. The following aggregate consequences of said prescription within the Basin and Relevant Watershed are hereby declared:

(a) Prior Prescription. Diversions within the Relevant Watershed have created rights for direct consumptive use within the Basin, as declared and determined in Sections 16 and 18 hereof, which are of equal priority inter se, but which are prior and paramount to Pumping Rights in the Basin.

(b) Mutual Prescription. The aggregate Prescriptive Pumping Rights of the parties who are Pumpers now exceed, and for many years prior to filing of this action, have exceeded, the Natural Safe Yield of the Basin. By reason of said condition, all rights of said Pumpers are declared to be mutually prescriptive and of equal priority, inter se.

(c) Common Ownership of Safe Yield and Incidents Thereto. By reason of said Overdraft and mutual Prescription, the entire Natural Safe Yield of the Basin, the Operating Safe Yield thereof and the appurtenant rights to Ground Water storage capacity of the Basin are owned by Pumpers in undivided Pumpers' Shares as hereinafter individually declared, subject to the control of Watermaster, pursuant to the Physical Solution herein decreed. Nothing herein shall be deemed in derogation of the rights to spread water pursuant to rights set forth in Exhibit "G".

16. Surface Rights. (Prior Judgment Section 10) Certain of the aforesaid prior and paramount prescriptive water rights of Diverters to Divert for Direct Use stream flow within the Relevant Watershed are hereby declared and found in terms of Base Annual Diversion Right as set forth in Exhibit "C". Each Diverter shown on Exhibit "C" shall be entitled to Divert for Direct Use up to two hundred percent (200%) of said Base Annual Diversion Right in any one (1) Fiscal Year; provided that the aggregate quantities of water Diverted in any consecutive ten (10) Fiscal Year period shall not exceed ten (10) times such Diverter's Base Annual Diversion Right.

17. Ground Water Rights. (Prior Judgment Section 11) The Prescriptive Pumping Right of each Pumper, who is not an Integrated Producer, and his Pumper's Share are declared as set forth in Exhibit "D".

18. Optional Integrated Production Rights. (Prior Judgment Section 12) Those parties listed on Exhibit "E" have elected to be treated as Integrated Producers. Integrated Production Rights have two (2) historical components:

(1) a fixed component based upon historic Diversions for Direct Use; and

(2) a mutually prescriptive Pumper's Share component based upon Pumping during the period 1953 through 1967.

Assessment and other Watermaster regulation of the rights of such parties shall relate to and be based upon each such component. So far as future exercise of such rights is concerned, however, the gross quantity of the aggregate right in any Fiscal Year may be exercised, in the sole discretion of such party, by either Diversion or Pumping or any combination or apportionment thereof; provided, that for Assessment purposes the first water Produced in any Fiscal Year (other than "Carry-over", under Section 49 hereof) shall be deemed an exercise of the Diversion Component, and any Production over said quantity shall be deemed Pumped water, regardless of the actual method of Production.

19. Special Category Rights. (Prior Judgment Section 13) The parties listed on Exhibit "F" have water rights in the Relevant Watershed which are not ordinary Production rights. The nature of each such right is as described in Exhibit "F".

20. Non-consumptive Practices. (Prior Judgment Section 14) Certain Producers have engaged in Water Diversion and spreading practices which have caused such Diversions to have a non-consumptive or beneficial impact upon the aggregate water supply available in the Basin. Said parties, and a statement of the nature of their rights, uses and practices, are set forth in Exhibit "G". The Physical Solution decreed herein, and particularly its provisions for Assessments, shall not apply to such non-consumptive uses. Watermaster may require reports on the operations of said parties.

21. Overlying Rights. (Prior Judgment Section 14.5) Producers listed in Exhibit "K" hereto were not parties herein at the time of the original entry of Judgment herein. They have exercised in good faith Overlying Rights to Produce water from the Basin during the periods subsequent to the entry of Judgment herein and have by self-help initiated or maintained appurtenant Overlying Rights. Such rights are exercisable without quantitative limit only on specifically described Overlying Land and cannot be separately conveyed or transferred apart therefrom. As to such rights and their exercise, the owners thereof shall become parties to this action and be subject to Watermaster Replacement Water assessments under Section 45(b) hereof, sufficient to purchase Replenishment Water to offset the net consumptive use of such Production and practices. In addition, the gross amount of such Production for such overlying use shall be subject to Watermaster Administration Assessments under Section 45(a) hereof and the consumptive use portion of such Production for overlying use shall be subject to

Watermaster's In-Lieu Water Cost Assessments under Section 45(d) hereof. The Producers presently entitled to exercise Overlying Rights, a description of the Overlying Land to which Overlying Rights are appurtenant, the nature of use and the consumptive use portion thereof are set forth in Exhibit "K" hereto. Watermaster may require reports and make inspections of the operations of said parties for purposes of verifying the uses set forth in said Exhibit "K", and, in the event of a material change, to redetermine the net amount of consumptive use by such parties as changed, in the exercise of such Overlying Rights.

Annually, during the first two (2) weeks of June in each calendar year, such Overlying Rights Producers shall submit to Watermaster a verified statement as to the nature of the then current uses of said Overlying Rights on said Overlying Lands for the next ensuing Fiscal Year, whereupon Watermaster shall either affirm the prior determination or redetermine the net amount of the consumptive use portion of the exercise of such Overlying Right by said Overlying Rights Producer.

C. <u>INJUNCTION</u>

22. <u>Injunction Against Unauthorized Production.</u> (Prior Judgment Section 15) Effective July 1, 1973, each and every party, its officers, agents, employees, successors and assigns, to whom rights to waters of the Basin or Relevant Watershed have been declared and decreed herein is **ENJOINED AND RESTRAINED** from Producing water for Direct Use from the Basin or the Relevant Watershed except pursuant to rights and Pumpers' Shares herein decreed or which may hereafter be acquired by transfer pursuant to Section 55, or under the provisions of the Physical Solution in this Judgment and the Court's continuing jurisdiction, provided that no party is enjoined from Producing up to five (5) acre feet per Fiscal Year.

23. <u>Injunction re Non-consumptive Uses.</u> (Prior Judgment Section 16) Each party listed in Exhibit "G", its officers, agents, employees, successors and assigns, is **ENJOINED AND RESTRAINED** from materially changing said non-consumptive method of use.

24. <u>Injunction re Change in Overlying Use Without Notice Thereof to Watermaster.</u> (Prior Judgment Section 16.5) Each party listed in Exhibit "K", its officers, agents, employees, successors and assigns, is **ENJOINED AND RESTRAINED** from materially changing said

overlying uses at any time without first notifying Watermaster of the intended change of use, in which event Watermaster shall promptly redetermine the consumptive use portion thereof to be effective after such change.

25. Injunction Against Unauthorized Recharge. (Prior Judgment Section 17) Each party, its officers, agents, employees, successors and assigns, is **ENJOINED AND RESTRAINED** from spreading, injecting or otherwise recharging water in the Basin except pursuant to: (a) an adjudicated non-consumptive use, or (b) consent and approval of or Cyclic Storage Agreement with Watermaster, or (c) subsequent order of this Court.

26. Injunction Against Transportation from Basin or Relevant Watershed. (Prior Judgment Section 18) Except upon further order of Court and except as provided in section 34(r) herein, all parties, other than Transporting Parties and MWD in its exercise of its Special Category Rights, to the extent authorized therein, are **ENJOINED AND RESTRAINED** from transporting water hereafter Produced from the Relevant Watershed or Basin outside the areas thereof. For purposes of this Section, water supplied through a city water system which lies chiefly within the Basin shall be deemed entirely used within the Basin. Transporting Parties are entitled to continue to transport water to the extent that any Production of water by any such party does not violate the injunctive revisions contained in Section 22 hereof; provided that said water shall be used within the present service areas or corporate or other boundaries and additions thereto so long as such additions are contiguous to the then existing service area or corporate or other boundaries; except that a maximum of ten percent (10%) of use in any Fiscal Year may be outside said then existing service areas or corporate or other boundaries. Notwithstanding the foregoing and without in any way changing or limiting the Transporting Parties' entitlement to transport water as set forth herein, any party may enter into an agreement with Watermaster to store Supplemental Water and export said stored Supplemental Water under specific terms and conditions approved by Watermaster. Such storage and export shall be subject to (1) a determination by Watermaster that no material injury to the Basin or parties will result therefrom; (2) execution of an agreement with Watermaster setting forth the terms and conditions upon which water may be stored in or exported from the Basin; and (3) compliance

with Watermaster Rules and Regulations respecting Basin storage and export. (Amended 6/21/12)

D. CONTINUING JURISDICTION

27. Jurisdiction Reserved. (Prior Judgment Section 19) Full jurisdiction, power and authority are retained by and reserved to the Court for purposes of enabling the Court upon application of any party or of the Watermaster, by motion and upon at least thirty (30) days notice thereof, and after hearing thereon, to make such further or supplemental orders or directions as may be necessary or appropriate for interim operation before the Physical Solution is fully operative, or for interpretation, enforcement or carrying out of this Judgment, and to modify, amend or amplify any of the provisions of this Judgment or to add to the provisions thereof consistent with the rights herein decreed. Provided, that nothing in this paragraph shall authorize:

(1) modification or amendment of the quantities specified in the declared rights of any party;

(2) modification or amendment of the manner of exercise of the Base Annual Diversion Right or Integrated Production Right of any party; or

(3) the imposition of an injunction prohibiting transportation outside the Relevant Watershed or Basin as against any Transporting Party transporting in accordance with the provisions of this Judgment or against MWD as to its Special Category Rights.

E. WATERMASTER

28. Watermaster to Administer Judgment. (Prior Judgment Section 20) A Watermaster comprised of nine (9) persons, to be nominated as hereinafter provided and appointed by the Court, shall administer and enforce the provisions of this Judgment and any subsequent instructions or orders of the Court thereunder.

29. Qualification, Nomination and Appointment. (Prior Judgment Section 21) The nine (9) member Watermaster shall be composed of six (6) Producer representatives and three (3) public representatives qualified, nominated and appointed as follows:

(a) Qualification. Any adult citizen of the State of California shall be eligible to serve as Watermaster; provided, however, that no officer, director, employee or agent of Upper District or San Gabriel District shall be qualified as a Producer member of Watermaster.

(b) Nomination of Producer Representatives. A meeting of all parties shall be held at the regular meeting of Watermaster in November of each year, at the offices of Watermaster. Nomination of the six (6) Producer representatives shall be by cumulative voting, in person or by proxy, with each Producer entitled to one (1) vote for each one hundred (100) acre-feet, or portion thereof, of Base Annual Diversion Right or Prescriptive Pumping Right or Integrated Production Right.

(c) Nomination of Public Representatives. On or before the regular meeting of Watermaster in November of each year, the three (3) public representatives shall be nominated by the boards of directors of Upper District (which shall select two [2]) and San Gabriel District (which shall select one [1]). Said nominees shall be members of the board of directors of said public districts.

(d) Appointment. All Watermaster nominations shall be promptly certified to the Court, which will in ordinary course confirm the same by an appropriate order appointing said Watermaster; provided, however, that the Court at all times reserves the right and power to refuse to appoint, or to remove, any member of Watermaster. Notwithstanding section 27 herein, Watermaster nominations may be promptly certified by the Court upon 10 calendar days' notice thereof, plus the time prescribed by statute for service by mail, e-mail or other electronic means. (Amended 6/21/12)

30. Term and Vacancies. (Prior Judgment Section 22) Each member of Watermaster shall serve for a one (1) year term commencing on January 1, following his appointment, or until his successor is appointed. In the event of a vacancy on Watermaster, a successor shall be nominated at a special meeting to be called by Watermaster within ninety (90) days (in the case of a Producer representative) or by action of the appropriate district board of directors (in the case of a public representative).

31. Quorum. (Prior Judgment Section 23) Five (5) members of the Watermaster shall constitute a quorum for the transaction of affairs of the Watermaster. Action by the affirmative vote of five (5) members shall constitute action by Watermaster, except that the affirmative vote of six (6) members shall be required:

(a) to approve the purchase, spreading or injection of water for Ground Water recharge, or

(b) to enter in any Agreement pursuant to Section 34 (n) hereof.

32. Compensation. (Prior Judgment Section 24) Each Watermaster member shall receive compensation of One Hundred Dollars ($100.00) per day for each day's attendance at meetings of Watermaster or for each day's service rendered as a Watermaster member at the request of Watermaster, together with any expenses incurred in the performance of his duties required or authorized by Watermaster. No member of the Watermaster shall be employed by or compensated for professional services rendered by him to Watermaster, other than the compensation herein provided, and any authorized travel or related expense.

33. Organization. (Prior Judgment Section 25) At its first meeting in each year, Watermaster shall elect a chairman and a vice chairman from its membership. It shall also select a secretary, a treasurer and such assistant secretaries and assistant treasurers as may be appropriate, any of whom may, but need not be, members of Watermaster.

(a) Minutes. Minutes of all Watermaster meetings shall be kept, which shall reflect all actions taken by Watermaster. Draft copies thereof shall be furnished to any party who files a request therefor in writing with Watermaster. Said draft copies of minutes shall constitute notice of any Watermaster action therein reported; failure to request copies thereof shall constitute waiver of notice.

(b) Regular Meetings. Watermaster shall hold regular meetings at places and times to be specified in Watermaster's rules and regulations to be adopted by Watermaster. Notice of the scheduled or regular meetings of Watermaster and of any changes in the time or place thereof shall be mailed to all parties who shall have filed a request therefor in writing with Watermaster.

(c) Special Meetings. Special meetings of Watermaster may be called at any time by the chairman or vice chairman or by any three (3) members of Watermaster by written notice delivered personally or mailed to each member of Watermaster and to each party requesting notice, at least twenty-four (24) hours before the time of each such meeting in the case of personal delivery, and forty-eight (48) hours prior to such meeting in the case of mail. The calling notice shall specify the time and place of the special meeting and the business to be transacted at such meeting. No other business shall be considered at such meeting.

(d) Adjournments. Any meeting of Watermaster may be adjourned to a time and place specified in the order of adjournment. Less than a quorum may so adjourn from time to time. A copy of the order or notice of adjournment shall be conspicuously posted on or near the door of the place where the meeting was held within twenty-four (24) hours after adoption of the order of adjournment.

34. Powers and Duties. (Prior Judgment Section 26) Subject to the continuing supervision and control of the Court, Watermaster shall have and may exercise the following express powers, and shall perform the following duties, together with any specific powers, authority and duties granted or imposed elsewhere in this Judgment or hereafter ordered or authorized by the Court in the exercise of its continuing jurisdiction.

(a) Rules and Regulations. To make and adopt any and all appropriate rules and regulations for conduct of Watermaster affairs. A copy of said rules and regulations and any amendments thereof shall be mailed to all parties.

(b) Acquisition of Facilities. To purchase, own, lease, acquire and hold, as trustee for the benefit of the Parties, all necessary personal property and equipment, and such limited real property such as office quarters, monitoring wells, the key well, and other facilities necessary to fulfill Watermaster's basin management responsibilities under this Judgment. (Amended 6/21/12)

(c) Employment of Experts and Agents. To employ such administrative personnel, engineering, geologic, accounting, legal, public policy education or other specialized services (but not including registered lobbyists) and consulting assistants as may be deemed appropriate in the carrying out of its powers and to require appropriate bonds from all officers and employees handling Watermaster funds. (Amended 6/21/12)

(d) Measuring Devices, etc. To cause parties, pursuant to uniform rules, to install and maintain in good operating condition, at the cost of each party, such necessary measuring devices or meters as may be appropriate; and to inspect and test any such measuring device as may be necessary.

(e) Assessments. To levy and collect all Assessments specified in the Physical Solution.

(f) Investment of Funds. To hold and invest any and all funds which Watermaster may possess in investments authorized from time to time for public agencies in the State of California.

(g) Borrowing. To borrow in anticipation of receipt of Assessment proceeds an amount not to exceed the annual amount of Assessments levied but uncollected, or in accordance with the provisions of Sections 45 and 46 hereto. Upon approval by the Watermaster at its regularly scheduled public meeting, when necessary to secure Supplemental Water, Watermaster may borrow funds in excess of the annual amount of Assessments levied but uncollected. Prior to borrowing funds, Watermaster shall meet and confer with Responsible Agencies and seek their input. Watermaster shall adopt Rules and Regulations specifying: (i) how debt repayment will be allocated among the Parties; (ii) that Watermaster obtain prior approval of the Court before incurring debt that exceeds the total of one year's levied Assessments; and (iii) such other matters as Watermaster deems appropriate for Rules and Regulations respecting the purchase of Supplemental Water using debt. (Amended 6/21/12)

(h) Purchase of and Recharge with Supplemental Water. To purchase Supplemental Water and to introduce the same into the Basin, including Reclaimed Water, for replenishment, Replacement Water, and cyclic storage purposes in the Basin subject to the affirmative vote of six (6) members of Watermaster, provided, the

California Department of Public Health and the Los Angeles Regional Water Quality Control Board have approved such Reclaimed Water for said uses, Watermaster has given prior notice to all parties of its intention to use said Reclaimed Water for such purposes, held noticed hearings thereon, and approves such uses. Reclaimed Water used by Watermaster as Supplemental Water for said purposes shall not be a violation of Sections 3(b) or 3(c) of Exhibit "H" hereto. (Amended 4/2/91 and 6/21/12)

(i) Contracts. To enter into contracts for the performance of any administrative powers herein granted, subject to approval of the Court.

(j) Cooperation with Existing Agencies. To act jointly or cooperate with agencies of the United States and the State of California or any political subdivision, municipality or district to the end that the purposes of the Physical Solution may be fully and economically carried out. (Amended 6/21/12)

(k) Assumption of Make-Up Obligation. Watermaster shall assume the Make-Up Obligation for and on behalf of the Basin.

(m) Water Quality. Water quality in the Basin shall be a concern of Watermaster, and all reasonable steps shall be taken to assist and encourage appropriate regulatory agencies to enforce reasonable water quality regulations affecting the Basin, including regulation of solid and liquid waste disposal.

(n) Cyclic Storage Agreements. To enter into appropriate contracts, to be approved by the Court, for utilization of Ground Water storage capacity of the Basin for cyclic or regulatory storage of Supplemental Water by parties and non-parties, for subsequent recovery or Watermaster credit by the storing entity, pursuant to uniform rules and conditions, which shall include provision for:

(1) Watermaster control of all spreading or injection and extraction scheduling and procedures for such stored water;

(2) calculation by Watermaster of any special costs, damages or burdens resulting from such operations;

(3) determination by Watermaster of, and accounting for, all losses in

stored water, assuming that such stored water floats on top of the Ground Water supplies, and accounting for all losses of water which otherwise would have replenished the Basin, with priorities being established as between two or more such contractors giving preference to parties over non-parties; and

(4) payment to Watermaster for the benefit of the parties hereto of all special costs, damages or burdens incurred (without any charge, rent, assessment or expense as to parties hereto by reason of the adjudicated proprietary character of said storage rights, nor credit or offset for benefits resulting from such storage); provided, that no party shall have any direct interest in or control over such contracts or the operation thereof by reason of the adjudicated right of such party, the Watermaster having sole custody and control of all Ground Water storage rights in the Basin pursuant to the Physical Solution herein, and subject to review of the Court.

(o) Notice List. Maintain a current list of party designees to receive notice hereunder, in accordance with Section 54 hereof.

(p) Authority to Sue. To prosecute litigation, engage in dispute resolution and file amicus curiae briefs in the furtherance of Watermaster's responsibilities under this Judgment. (Amended 6/21/12)

(q) Public Policy Education. To perform public policy education activities in furtherance of Watermaster's responsibilities under this Judgment. (Amended 6/21/12)

(r) Export Agreements. Watermaster may fix terms and conditions under which parties and non-parties may store Supplemental Water in and export said stored Supplemental Water from the Basin. (Amended 6/21/12)

35. Policy Decisions – Procedure. (Prior Judgment Section 27) It is contemplated that Watermaster will exercise discretion in making policy decisions relating to Basin management under the Physical Solution decreed herein. In order to assure full participation and opportunity to be heard for those affected, no policy decision shall be made by Watermaster until thirty (30) days after the question involved has been raised for discussion at a Watermaster

meeting and noted in the draft of minutes thereof.

36. Reports. (Prior Judgment Section 28) Watermaster shall annually file with the Court and mail to the parties a report of all Watermaster activities during the preceding year, including an audited statement of all accounts and financial activities of Watermaster, summary reports of Diversions and Pumping, and all other pertinent information. To the extent practical, said report shall be mailed to all parties on or before November 1. The tables set forth in Exhibits C, D, E, K, L and M are listed for reference purposes only. Future updates to those exhibits shall be set forth in the Watermaster annual report. In lieu of mailing the annual report, Watermaster in its discretion may post the report on its website, mail or e-mail a notice of availability to the parties, and/or provide a hard copy of the report upon request. If a party does not have a valid e-mail address or internet access, that party shall identify an alternative method of service to be approved by Watermaster in its sole discretion. (Amended 6/21/12)

37. Review Procedures. (Prior Judgment Section 29) Any action, decision, rule or procedure of Watermaster (other than a decision establishing Operating Safe Yield, see Section 43(c)) shall be subject to review by the Court on its own motion or on timely motion for an Order to Show Cause by any party, as follows:

(a) Effective Date of Watermaster Action. Any order, decision or action of Watermaster shall be deemed to have occurred on the date that written notice thereof is mailed. Mailing of draft copies of Watermaster minutes to the parties requesting the same shall constitute notice to all such parties.

(b) Notice of Motion. Any party may, by a regularly noticed motion, petition the Court for review of said Watermaster's action or decision. Notice of such motion shall be mailed to Watermaster and all parties. Unless so ordered by the Court, such petition shall not operate to stay the effect of such Watermaster action.

(c) Time for Motion. Notice of motion to review any Watermaster action or decision shall be served and filed within ninety (90) days after such Watermaster action or decision.

(d) De Novo Nature of Proceeding. Upon filing of such motion for hearing, the

Court shall notify the parties of a date for taking evidence and argument, and shall review de novo the question at issue on the date designated. The Watermaster decision or action shall have no evidentiary weight in such proceeding.

(e) Decision. The decision of the Court in such proceeding shall be an appealable Supplemental Order in this case. When the same is final, it shall be binding upon the Watermaster and the parties.

F. PHYSICAL SOLUTION

38. Purpose and Objective. (Prior Judgment Section 30) Consistent with the California Constitution and the decisions of the Supreme Court, the Court hereby adopts and Orders the parties to comply with this Physical Solution. The purpose and objective of these provisions is to provide a legal and practical means for accomplishing the most economic, long term, conjunctive utilization of surface, Ground Water, Supplemental Water and Ground Water storage capacity to meet the needs and requirements of the water users dependent upon the Basin and Relevant Watershed, while preserving existing equities.

39. Need for Flexibility. (Prior Judgment Section 31) In order that Watermaster may be free to utilize both existing and new and developing technological, social and economic concepts for the fullest benefit of all those dependent upon the Basin, it is essential that the Physical Solution hereunder provide for maximum flexibility and adaptability. To that end, the Court has retained continuing jurisdiction to supplement the broad discretion herein granted to the Watermaster.

40. Watermaster Control. (Prior Judgment Section 32) In order to develop an adequate and effective program of Basin management, it is essential that Watermaster have broad discretion in the making of Basin management decisions within the ambit hereinafter set forth. The maintenance, improvement, and control of the water quality and quantity of the Basin, withdrawal and replenishment of supplies of the Basin and Relevant Watershed, and the utilization of the water resources thereof, must be subject to procedures established by Watermaster in implementation of the provisions of this Judgment. Both the quantity and quality of said water resource are thereby preserved and its beneficial utilization maximized.

(Amended 1/29/91)

(a) Watermaster shall develop an adequate and effective program of Basin management. The maintenance, improvement, and control of the water quality and quantity of the Basin, withdrawal and replenishment of supplies of the Basin and Relevant Watershed, and the utilization of the water resources thereof, must be subject to procedures established by Watermaster in implementation of the Physical Solution provisions of this Judgment. All Watermaster programs and procedures shall be adopted only after a duly noticed public hearing pursuant to Section 37 and 40 of the Amended Judgment herein. (Amended 1/29/91)

(b) Watermaster shall have the power to control pumping in the Basin by water Producers therein for Basin cleanup and water quality control so that specific well production can be directed as to a lesser amount, to total cessation, as to an increased amount, and even to require pumping in a new location in the Basin. Watermaster's right to regulate pumping activities of Producers shall be subordinate to any conflicting Basin cleanup plan established by the EPA or other public governmental agency with responsibility for ground water management or clean up, whether existing at the time of this Judgment or subsequent hereto. (Amended 2/24/92)

(c) Watermaster may act individually or participate with others to carry on technical and other necessary investigations of all kinds and collect data necessary to carry out the herein stated purposes. It may engage in contractual relations with the EPA or other agencies in furtherance of the clean up of the Basin and enter into contracts with agencies of the United States, the State of California, or any political subdivision, municipality, or district thereof, to the extent allowed under the applicable federal or state statutes. Any cooperative agreement between the Watermaster and EPA shall require the approval of the appropriate Agency(s) of the State of California. (Amended 1/29/91)

(d) For the regulation and control of pumping activity in the Basin, Watermaster shall adopt Rules and Regulations and programs to promote, manage and accomplish clean up of the Basin and its waters, including, but not limited to, measures to confine, move, and remove contaminants and pollutants. Such Rules and Regulations and programs shall be adopted only after a duly Noticed Public Hearing by Watermaster and shall be subject to Court review pursuant to Section 37 of the Amended Judgment herein. (Amended 1/29/91)

(e) Watermaster shall determine whether funds from local, regional, state or federal agencies are available for regulating pumping and the various costs associated with, or arising from such activities. If no public funds are available from local, regional, state, or federal agencies, the costs shall be obtained and paid by way of an In-Lieu Assessment by Watermaster pursuant to Section 10(j) of the Amended Judgment herein. Provided such In-Lieu Assessments become necessary, the costs shall be borne by all Basin Producers. (Amended 1/29/91)

(f) Watermaster is a Court empowered entity with limited powers, created pursuant to the Court's Physical Solution Jurisdiction under Article X, Section 2 of the California Constitution. None of the powers granted herein to Watermaster shall be construed as designating Watermaster a political subdivision of the State of California or authorizing Watermaster to act as "lead agency" to administer the federal Superfund for clean up of the Basin. (Amended 1/29/91)

41. General Pattern of Contemplated Operations. (Prior Judgment Section 33) In general outline (subject to the specific provisions hereafter and to Watermaster Operating Criteria set forth in Exhibit "H"), Watermaster will determine annually the Operating Safe Yield of the Basin and will notify each Pumper of his share thereof, stated in acre feet per Fiscal Year. Thereafter, no party may Produce in any Fiscal Year an amount in excess of the sum of his Diversion Right, if any, plus his Pumper's Share of such Operating Safe Yield, or his Integrated Production Right, or the terms of any Cyclic Storage Agreement, without being subject to Assessment for the purpose of purchasing Replacement Water. In establishing the Operating Safe Yield, Watermaster shall follow all physical, economic, and other relevant parameters provided in the Watermaster Operating Criteria. Watermaster shall have Assessment powers to

raise funds essential to implement the management plan in any of the several special circumstances herein described in more detail.

42. Basin Operating Criteria. (Prior Judgment Section 34) Until further order of the Court, Watermaster shall recharge Replacement Water in accordance with the Watermaster Operating Criteria and, insofar as practicable, to maintain the water level at the Key Well above Elevation two hundred (200). (Amended 6/21/12)

43. Determination of Operating Safe Yield. (Prior Judgment Section 35) Watermaster shall annually determine the Operating Safe Yield applicable to the succeeding Fiscal Year and estimate the same for the next succeeding four (4) Fiscal Years. In making such determination, Watermaster shall be governed in the exercise of its discretion by the Watermaster Operating Criteria. The procedures with reference to said determination shall be as follows:

(a) Preliminary Determination. On or before Watermaster's first meeting in April of each year, Watermaster shall make a Preliminary Determination of the Operating Safe Yield of the Basin for each of the succeeding five Fiscal Years. Said determination shall be made in the form of a report containing a summary statement of the considerations, calculations and factors used by Watermaster in arriving at said Operating Safe Yield.

(b) Notice and Hearing. A copy of said Preliminary Determination and report shall be mailed to each Pumper and Integrated Producer at least ten (10) days prior to a hearing to be held at Watermaster's regular meeting in May, of each year, at which time objections or suggested corrections or modifications of said determinations shall be considered. Said hearing shall be held pursuant to procedures adopted by Watermaster.

(c) Watermaster Determination and Review Thereof. Within thirty (30) days after completion of said hearing, Watermaster shall mail to each Pumper and Integrated Producer a final report and determination of said Operating Safe Yield for each such Fiscal Year, together with a statement of the Producer's entitlement in each such Fiscal Year stated in acre-feet. Any affected party, within thirty (30) days of mailing of notice of said Watermaster determination, may, by a regularly noticed motion, petition the Court for an Order to Show Cause for review of said Watermaster finding, and thereupon the Court shall hear such objections and settle such dispute. Unless so ordered by the Court, such petition shall not operate to stay the effect of said report and determination. In the absence of such review proceedings, the Watermaster determination shall be final.

44. Reports of Pumping and Diversion. (Prior Judgment Section 36) Each party shall file with the Watermaster quarterly, on or before the last day of January, April, July and October, a report on a form to be prescribed by Watermaster showing the total Pumping and Diversion (separately for Direct Use and for non-consumptive use, if any) of such party during the preceding calendar quarter.

45. Assessments – Purpose. (Prior Judgment Section 37)

(a) Statement of Authority and Need for Flexibility: Watermaster shall have the power to levy and collect Assessments from the parties (other than non-consumptive users, or Production under Special Category Rights or Cyclic Storage Agreements) based upon Production during the preceding Fiscal Year. Assessments on Minimal Producers will apply only to (1) existing parties who become Minimal Producers in the future; and (2) Minimal Producers who intervene after June 21, 2012. Because Supplemental Water may not be available for extended periods of time, Watermaster requires flexibility with respect to the procedures for purchasing Supplemental Water supplies, as and when those supplies become available. This Judgment is a Physical Solution entered pursuant to California Constitution Article X, Section 2, which recognizes that the timing and amount of Watermaster Assessments for Replacement Water costs must be determined in light of this uncertainty. This Judgment therefore grants Watermaster the flexibility and discretion necessary to purchase and pre-purchase Supplemental Water and levy assessments in an appropriate and equitable manner and amount to maximize the opportunities to secure necessary Supplemental Waters in the best interest of the parties and the long-term sustainability of the Basin. In accordance with Rules and Regulations adopted by Watermaster, to further enhance flexibility, Watermaster may borrow money from any available fund maintained by it for purposes other than Replacement Water purchases, or use accrued funds, to purchase Supplemental Water. (Amended 6/21/12)

(b) Authorized Assessments: Said Assessments may be for one or more of the following purposes:

(1) Watermaster Administration Costs. (Former Section 45(a)) Within thirty (30) days after completion of the hearing on the Preliminary Determination of the Operating Safe Yield of the Basin and Watermaster's determination thereof, pursuant to Section 43 hereof, Watermaster shall adopt a proposed budget for the succeeding Fiscal Year and shall mail a copy thereof to each party, together with a statement of the level of Administration Assessment levied by Watermaster which will be collected for purposes of raising funds for said budget. Said Assessment shall be uniformly applicable to each acre-foot of Production. (Amended 6/21/12)

(2) Replacement Water Costs. (Former Section 45(b)) Replacement Water Assessments shall be collected from each party on account of such party's Production in excess of its Diversion Rights, Pumper's Share or Integrated Production Right, and on account of the consumptive use portion of Overlying Rights, computed at the applicable rate established by Watermaster consistent with the Watermaster Operating Criteria, and other relevant factors, including the projected cost and availability of Supplemental Water supplies. Subject to Rules and Regulations adopted by Watermaster, Watermaster Replacement Water Assessment rates may be in an amount calculated to allow Watermaster to purchase more than one acre-foot of Supplemental Water for each acre-foot of excess Production to which such Assessment applies, when such purchases are necessary to secure Supplemental Water supplies for the benefit of the Basin and parties. (Amended 6/21/12)

(3) Make-Up Obligation. (Former Section 45(c)) An Assessment shall be collected equally on account of each acre-foot of Production, which does not

bear a Replacement Assessment hereunder, to pay all necessary costs of Administration and satisfaction of the Make-Up Obligation. Such Assessment shall not be applicable to water Production for an Overlying Right.

(4) In-Lieu Water Cost. (Former Section 45(d)) Watermaster may levy an Assessment against all Pumping to pay reimbursement for In-Lieu Water Costs except that such Assessment shall not be applicable to the non-consumptive use portion of an Overlying Right.

(5) Basin Water Quality Improvement. (Former Section 45(e)) For purposes of testing, protecting or improving the water quality in the Basin, Watermaster may, after a noticed hearing thereon, fix terms and conditions under which it may waive all or any part of its Assessments on such ground water Production and if such Production, in addition to his other Production, does not exceed such Producer's Share or entitlement for that Fiscal Year, such stated Production shall be allowed to be carried over for a part of such Producer's next Fiscal Year's Producer's Share or entitlement. In connection therewith, Watermaster may also waive the provisions of Section 25, 26 and 57 hereof, relating to Injunction Against Unauthorized Recharge, Injunction Against Transportation From Basin or Relevant Watershed, and Intervention After Judgment, respectively. Nothing in this Judgment is intended to allow an increase in any Producer's annual entitlement nor to prevent Watermaster, after hearing thereon, from entering into contracts to encourage, assist and accomplish the clean up and improvement of degraded water quality in the Basin by non-parties herein. Such contracts may include the exemption of the Production of such Basin water therefor from Watermaster Assessments and, in connection therewith, the waiver of the provisions of Judgment Sections 25, 26, and 57 hereof.

(6) Export and Storage. Watermaster shall levy an assessment to account for costs, burdens or losses incurred in connection with such exported or stored

water, including a fee for storage administration. Such storage or export shall be subject to (1) a determination by Watermaster that no material injury to the Basin or parties will result therefrom; (2) execution of an agreement with Watermaster setting forth the terms and conditions upon which water may be stored in or exported from the Basin; and (3) compliance with Watermaster Rules and Regulations respecting Basin storage and export. (Amended 6/21/12)

(7) Water Resource Development Assessment. Watermaster may levy an Assessment on all Pumping, as determined through Rules and Regulations to be adopted by the Watermaster, to support the purchase, financing, and/or development of new or additional Supplemental Water sources, in cooperation with one or more Responsible Agencies as appropriate. (Amended 6/21/12)

46. Assessments – Procedure. (Prior Judgment Section 38) Assessments herein provided for shall be levied and collected as follows:

(a) Levy and Notice of Assessment. Within thirty (30) days of Watermaster's annual determination of Operating Safe Yield of the Basin for each Fiscal Year and succeeding four (4) Fiscal Years, and at such other time[s] of the year as determined by Watermaster, Watermaster shall levy applicable Administration Assessments, Replacement Water Assessments, Make-Up Water Assessments, In-Lieu Water Assessments, and Water Resource Development Assessments, if any. Watermaster shall give written notice of all applicable Assessments to each party on or before August 15, of each year, and at such other time[s] as determined by Watermaster. To provide flexibility and maximize the opportunity to secure Replacement Water supplies when available, in accordance with criteria set forth in the Watermaster Rules and Regulations, Watermaster may levy supplemental assessments as necessary to create sufficient funds to purchase and pre-purchase such Replacement Water supplies for the benefit of the Basin and parties. (Amended 6/21/12)

(b) Payment. Each Assessment shall be payable, and each party is Ordered to pay the same, on or before September 20, following such Assessment, subject to the rights reserved in Section 37 hereof.

(c) Delinquency. Any Assessment which becomes delinquent after January 1, 1980, shall bear interest at the annual prime rate plus one percent (1%) in effect on the first business day of August of each year. Said prime interest rate shall be that fixed by the Bank of America NT&SA for its preferred borrowing customers on said date. Said prime interest rate plus one percent (1%) shall be applicable to any said delinquent Assessment from the due date thereof until paid. Provided, however, in no event shall any said delinquent Assessment bear interest at a rate of less than ten percent (10%) per annum. Such delinquent Assessment and interest may be collected in a Show Cause proceeding herein or any other legal proceeding instituted by Watermaster, and in such proceeding the Court may allow Watermaster its reasonable costs of collection, including attorney's fees.

47. Availability of Supplemental Water from Responsible Agencies. (Prior Judgment Section 39) If any Responsible Agency shall, for any reason, be unable to deliver Supplemental Water to Watermaster in a timely fashion when needed, Watermaster may (1) collect funds at an appropriate level and hold them in trust, together with interest accrued thereon, for purchase of such water when available; (2) purchase water from the remaining Responsible Agencies which are the most beneficial and appropriate sources observing all legal and contractual constraints on the availability of such water; or (3) purchase Supplemental Water from any other available source. Watermaster shall consult with the Responsible Agencies involved and in good faith shall determine the appropriate source of Supplemental Water under such circumstances. Should Watermaster arrange to purchase Supplemental Water from a source not involving a Responsible Agency, Watermaster shall provide the Responsible Agencies an opportunity to provide said Supplemental Water or comparable water supplies on comparable terms. (Amended 6/21/12)

48. Accumulation of Replacement Water Assessment Proceeds. (Prior Judgment Section 40) In order to minimize fluctuation in Assessments and to give Watermaster flexibility in Basin management, Watermaster may make reasonable accumulations of Replacement Water

Assessments. Such moneys and any interest accrued thereon shall only be used for the purchase of Replacement Water.

49. Carry-over of Unused Rights. (Prior Judgment Section 41) Any Pumper's Share of Operating Safe Yield, and the Production right of any Integrated Producer, which is not Produced in a given Fiscal Year may be carried over and accumulated for one Fiscal Year, pursuant to reasonable rules and procedures for notice and accounting which shall be adopted by Watermaster. The first water Produced in the succeeding Fiscal Year shall be deemed Produced pursuant to such Carry-over Rights.

50. Minimal Producers. (Prior Judgment Section 42) In the interest of Justice, Minimal Producers who initiated production on or before June 21, 2012, are exempted from the operation of this Physical Solution, so long as such party's annual Production does not exceed five (5) acre-feet. Watermaster may require, and Minimal Producers shall furnish, specific periodic reports. In addition, Watermaster may conduct such investigation of future operations of any Minimal Producer as may be appropriate. As of June 21, 2012, there shall be no new Minimal Producers, and any new Producer shall be subject to all provisions of the Judgment. (Amended 6/21/12)

51. Effective Date. (Prior Judgment Section 43) The effective date for commencing accounting and operation under this Physical Solution, other than for Replacement Water Assessments, shall be July 1, 1972. The first Assessment for Replacement Water shall be payable on September 20, 1974, on account of Fiscal Year 1973-74 Production.

G. MISCELLANEOUS PROVISIONS

52. Puente Narrows Flow. (Prior Judgment Section 44) The Puente Basin is tributary to the Main San Gabriel Basin. All Producers within said Puente Basin have been dismissed herein, based upon the Puente Narrows Agreement (Exhibit "J"), whereby Puente Basin Water Agency agreed not to interfere with surface inflow and to assure continuance of historic subsurface contribution of water to Main San Gabriel Basin. The Court declares said Agreement to be reasonable and fair and in full satisfaction of claims by Main San Gabriel Basin for natural water from Puente Basin.

53. Deleted Section (Amended 6/21/12)

54. Service Upon and Delivery to Parties of Various Papers. (Prior Judgment Section 46) Service of the Judgment on those parties who have executed the Stipulation for Judgment shall be made by first class mail, postage prepaid, addressed to the Designee and at the address designated for that purpose in the executed and filed counterpart of the Stipulation for Judgment, or in any substitute designation filed with the Court.

Each party who has not heretofore made such a designation shall, within thirty (30) days after the Judgment shall have been served upon that party, file with the Court, with proof of service of a copy thereof upon Watermaster, a written designation of the person to whom and the address at which all future notices, determinations, requests, demands, objections, reports and other papers and processes to be served upon that party or delivered to that party are to be so served or delivered.

A later substitute designation filed and served in the same manner by any party shall be effective from the date of filing as to the then future notices, determinations, requests, demands, objections, reports and other papers and processes to be served upon or delivered to that party.

Delivery to or service upon any party by Watermaster, by any other party, or by the Court, of any item required to be served upon or delivered to a party under or pursuant to the Judgment may be made by deposit thereof (or by copy thereof) in the mail, first class, postage prepaid, addressed to the Designee of the party and at the address shown in the latest designation filed by that party. In lieu of mailing any item required to be served under this Judgment, Watermaster may serve such item by electronic service, which may include posting the document to Watermaster's website, sending an e-mail of the document to that party, or sending a notice of availability to that party indicating the document's availability for viewing on the Watermaster website. If a party does not have a valid e-mail address or internet access, that party shall identify an alternative method of service to be approved by Watermaster in its sole discretion.

Any party desiring to be relieved of receiving notices of Watermaster activity may file a waiver of notice on a form to be provided by Watermaster. Thereafter such party shall be removed from the active party service list and not receive any notices required under this Judgment. The parties have a duty to keep Watermaster informed of their current e-mail and mailing addresses. If mail or e-mail is returned undeliverable to Watermaster for an incorrect address, Watermaster in its sole discretion may remove that party from the active party service list. (Amended 6/21/12)

55. Assignment, Transfer, etc., of Rights. (Prior Judgment Section 47) Any rights Adjudicated herein except Overlying Rights, may be assigned, transferred, licensed or leased by the owners thereof; provided however, that no such assignment shall be complete until the appropriate notice procedures established by Watermaster have been complied with. No water Produced pursuant to rights assigned, transferred, licensed, or leased may be transported outside the Relevant Watershed except by:

(1) a Transporting Party, or

(2) a successor in interest immediate or mediate to a water system on lands or portion thereof, theretofore served by such a Transporting Party, for use by such successor in accordance with limitations applicable to Transporting Parties, or

(3) a successor in interest to the Special Category rights of MWD.

The transfer and use of Overlying Rights shall be limited, as provided in Section 21 hereof, as exercisable only on the specifically defined Overlying Lands and they cannot be separately conveyed or transferred apart therefrom.

56. Abandonment of Rights. (Prior Judgment Section 48) It is in the interest of reasonable beneficial use of the Basin and its water supply that no party be encouraged to take and use more water in any Fiscal Year than is actually required. Failure to Produce all of the water to which a party is entitled hereunder shall not, in and of itself, be deemed or constitute an abandonment of such party's right, in whole or in part. Abandonment and extinction of any right herein Adjudicated shall be accomplished only by:

(1) a written election by the party, filed in this case, or

(2) upon noticed motion of Watermaster, and after hearing.

In either case, such abandonment shall be confirmed by express subsequent order of this

Court.

57. Intervention After Judgment. (Prior Judgment Section 49) Any person who is not a party or successor to a party and who proposes to Produce water from the Basin or Relevant Watershed, may seek to become a party to this Judgment through a Stipulation For Intervention entered into with Watermaster. Watermaster may execute said Stipulation on behalf of the other parties herein but such Stipulation shall not preclude a party from opposing such Intervention at the time of the Court hearing thereon. Said Stipulation For Intervention must thereupon be filed with the Court, which will consider an order confirming said Intervention following thirty (30) days' notice to the parties. Thereafter, if approved by the Court, such Intervenor shall be a party bound by this Judgment and entitled to the rights and privileges accorded under the Physical Solution herein.

58. Judgment Binding on Successors, etc. (Prior Judgment Section 50) Subject to specific provisions hereinbefore contained, this Judgment and all provisions thereof are applicable to and binding upon and inure to the benefit of not only the parties to this action, but as well to their respective heirs, executors, administrators, successors, assigns, lessees, licensees and to the agents, employees and attorneys in fact of any such persons.

59. Water Rights Permits. (Prior Judgment Section 51) Nothing herein shall be construed as affecting the relative rights and priorities between MWD and San Gabriel Valley Protective Association under State Water Rights Permits Nos. 7174 and 7175, respectively.

60. Costs. (Prior Judgment Section 52) No party shall recover any costs in this proceeding from any other party.

61. Entry of Judgment. (New) The Clerk shall enter this Judgment.

DATED: June 21, 2012

s/ Maureen Duffy-Lewis
Maureen Duffy-Lewis, Judge
Specially Assigned

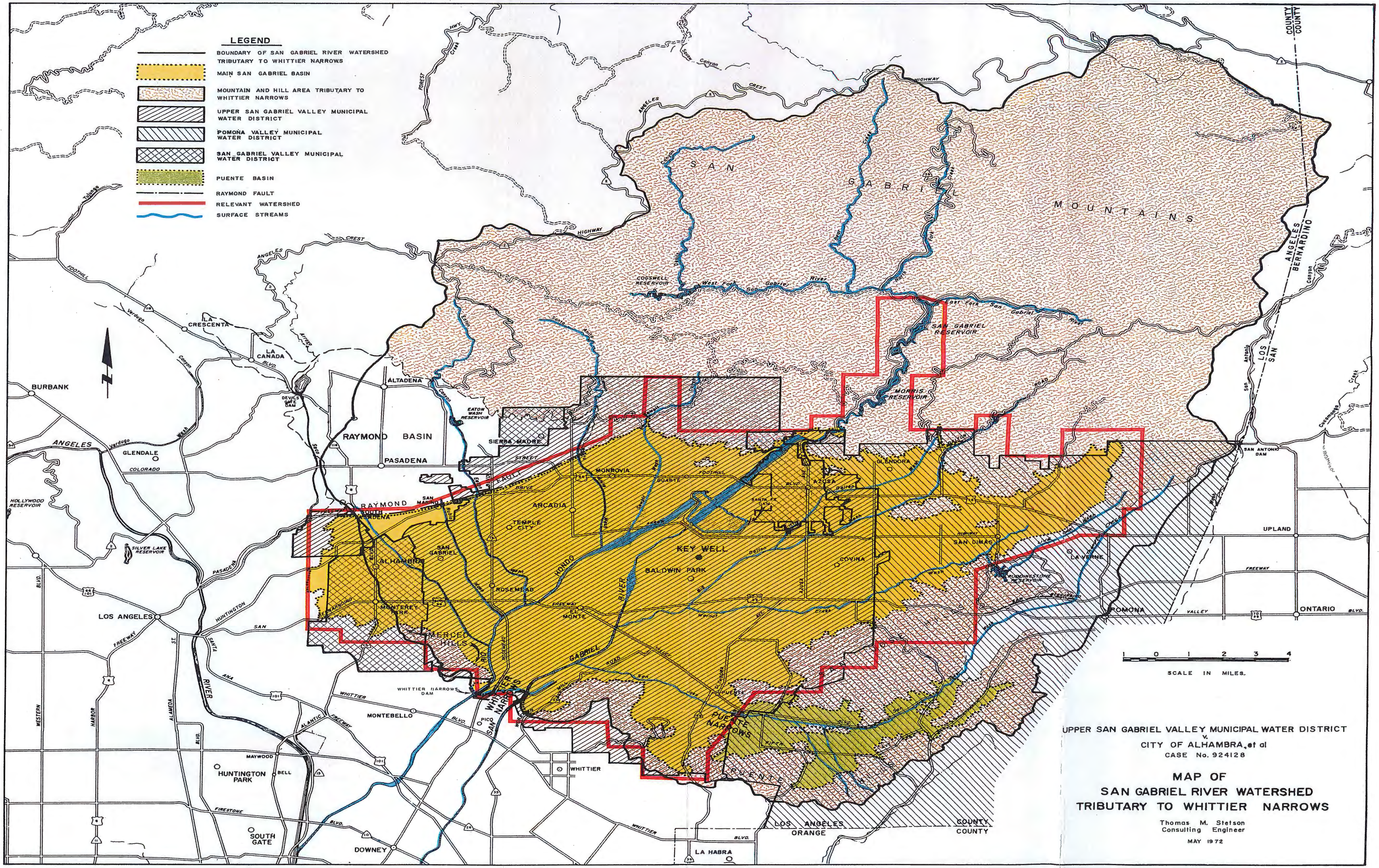

LEGEND
BOUNDARY OF SAN GABRIEL RIVER WATERSHED TRIBUTARY TO WHITTIER NARROWS
MAIN SAN GABRIEL BASIN
MOUNTAIN AND HILL AREA TRIBUTARY TO WHITTIER NARROWS
UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
POMONA VALLEY MUNICIPAL WATER DISTRICT
SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
PUENTE BASIN
RAYMOND FAULT
RELEVANT WATERSHED
SURFACE STREAMS
SAN GABRIEL MOUNTAINS
COGSWELL RESERVOIR
SAN GABRIEL RESERVOIR
MORRIS RESERVOIR
EATON WASH RESERVOIR
DEVILS GATE DAM
SAN ANTONIO DAM
PUDDINGSTONE RESERVOIR
WHITTIER NARROWS DAM
RAYMOND BASIN
KEY WELL
PUENTE NARROWS
MERCED HILLS
BURBANK
GLENDALE
LA CRESCENTA
LA CANADA
ALTADENA
PASADENA
SIERRA MADRE
MONROVIA
ARCADIA
TEMPLE CITY
SAN GABRIEL
ALHAMBRA
MONTEREY PARK
ROSEMEAD
EL MONTE
BALDWIN PARK
AZUSA
GLENDORA
COVINA
SAN DIMAS
LA VERNE
POMONA
UPLAND
ONTARIO
LOS ANGELES
MONTEBELLO
WHITTIER
MAYWOOD
HUNTINGTON PARK
BELL
SOUTH GATE
DOWNEY
LA HABRA
HOLLYWOOD RESERVOIR
SILVER LAKE RESERVOIR
LOS ANGELES COUNTY
ORANGE COUNTY
LOS ANGELES COUNTY
SAN BERNARDINO COUNTY
0 1 2 3 4
SCALE IN MILES.
UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
v.
CITY OF ALHAMBRA, et al
CASE No. 924128
MAP OF
SAN GABRIEL RIVER WATERSHED
TRIBUTARY TO WHITTIER NARROWS
Thomas M. Stetson
Consulting Engineer
MAY 1972

EXHIBIT "A"

EXHIBIT "B"

BOUNDARIES OF RELEVANT WATERSHED

The following described property is located in Los Angeles County, State of California:

Beginning at the Southwest corner of Section 14, Township 1 North, Range 11 West, San Bernardino Base and Meridian;

Thence Northerly along the West line of said Section 14 to the Northwest corner of the South half of said Section 14;

Thence Easterly along the North line of the South half of Section 14 to the East line of said Section 14;

Thence Northerly along the East line of said Section 14, Township 1 North, Range 11 West and continuing Northerly along the East line of Section 11 to the Northeast corner of said Section 11;

Thence Easterly along the North line of Section 12 to the Northeast corner of said Section 12;

Thence Southerly along the East line of said Section 12 and continuing Southerly along the East line of Section 13 to the Southeast corner of said Section 13, said corner being also the Southwest corner of Section 18, Township 1 North, Range 10 West;

Thence Easterly along the South line of Sections 18, 17, 16 and 15 of said Township 1 North, Range 10 West to the Southwest corner of Section 14;

Thence Northerly along the West line of Section 14 to the Northwest corner of the South half of Section 14;

Thence Easterly along the North line of the South half of Section 14 to the East line of said section;

Thence Northerly along the East line of said Section 14, and continuing Northerly along the West line of Section 12 of said Township 1 North, Range 10 West to the North line of said Section 12;

Thence Easterly along the North line of said Section 12, to the Northeast corner of said Section 12, said corner being also the Southwest corner of Section 6, Township 1 North, Range 9 West;

Thence Northerly along the West line of said Section 6 and continuing Northerly along West line of Sections 31 and 30, Township 2 North, Range 9 West to the Westerly prolongation of the North line of said Section 30;

Thence Easterly along said Westerly prolongation of the North line of said Section 30 and continuing Easterly along the North line of Section 29 to the Northeast corner of said Section 29;

Thence Southerly along the East line of said Section 29 and continuing Southerly along the East line of Section 32, Township 2 North, Range 9 West, and thence continuing Southerly along the East line of Section 5, Township 1 North, Range 9 West to the Southeast corner of said Section 5;

Thence Westerly along the South line of said Section 5 to the Southwest corner of said Section 5, said point being also the Northwest corner of Section 8;

Thence Southerly along the West line of said Section 8 and continuing Southerly along the West line of Section 17, to the Southwest corner of said Section 17, said corner being also the Northwest corner of Section 20;

Thence Easterly along the North line of Sections 20 and 21 to the Northwest corner of Section 22, said corner being also the Southwest corner of Section 15;

Thence Northerly along the West line of said Section 15 to the Northwest corner of the South half of said Section 15;

Thence Easterly along the North line of said South half of Section 15 to the Northeast corner of said South half of Section 15;

Thence Southerly along the East line of Section 15 and continuing Southerly along the East line of Section 22 to the Southeast corner of said Section 22, said point being also the Southwest corner of Section 23;

Thence Easterly along the South line of Sections 23 and 24 to the East line of the West half of said Section 24;

Thence Northerly along said East line of the West half of Section 24 to the North line thereof;

Thence Easterly along said North line of Section 24 to the Northeast corner thereof, said point also being the Northwest corner of Section 19, Township 1 North, Range 8 West;

Thence continuing Easterly along the North line of Section 19 and Section 20 of said Township 1 North, Range 8 West to the Northeast corner of said Section 20;

Thence Southerly along the East line of Sections 20, 29 and 32 of said Township 1 North, Range 8 West to the Southeast corner of said Section 32;

Thence Westerly along the South line of Section 32 to the Northwest corner of the East half of Section 5, Township 1 South, Range 8 West;

Thence Southerly along the West line of the East half of said Section 5 to the South line of said Section 5;

Thence West to the East line of the Northerly prolongation of Range 9 West;

EXHIBIT "C"

TABLE SHOWING BASE ANNUAL DIVERSION RIGHTS OF CERTAIN DIVERTERS AS OF JUNE 21, 2012

DIVERTER	BASE ANNUAL DIVERSION RIGHT (ACRE-FEET)
Covell, Ralph	2.12
(Successor to Rittenhouse, Catherine and Rittenhouse, James)[1]	
(Transferred to Aqua Capital Management LP)[2]	-2.12
	0.00
Maddock, A. G.	3.40
(Transferred to San Gabriel Valley Water Company)[2]	-3.40
	0.00
Rittenhouse, Catherine	**0.00**
(Transferred to Covell, Ralph)[1]	
Rittenhouse, James	**0.00**
(Transferred to Covell, Ralph)[1]	
Ruebhausen, Arline	18.34
(Held in common with Ruebhausen, Victor)	
(Transferred to City of Glendora)[2]	-18.34
	0.00
Ruebhausen, Victor	--
(See Ruebhausen, Arline)	
TOTAL	**0.00**

1/ Permanent transfer of rights as recorded at entry of Judgment.
2/ Permanent transfer of rights after entry of Judgment.
3/ Intervenor after Judgment.

EXHIBIT "D"

TABLE SHOWING RIGHTS AND PUMPER'S SHARE OF EACH PUMPER AS OF JUNE 21, 2012

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
6W Farms, Inc.	1,217.40	0.61599
(Formerly Woodland Farms, Inc.)		
(Transferred to:		
Miller Brewing Company	-919.50	-0.46526
Richard J. Woodland)[2]	-297.90	-0.15073
	0.00	**0.00000**
Adams Ranch Mutual Water Company	**100.00**	**0.05060**
A & E Plastik Pak Co., Inc.	**0.00**	**0.00000**
(Transferred to Industry Properties, Ltd.)[1]		
Alhambra, City of	**8,812.05**	**4.45876**
Amarillo Mutual Water Company	**709.00**	**0.35874**
American Sheds, Inc.[3]		
(Successor to Southwestern Portland Cement Company)[2]	742.00	0.37544
(Transferred to USA Waste of California, Inc.)[2]	-742.00	-0.37544
	0.00	**0.00000**
Anchor Plating Co., Inc.[3]		
(Successor to Bodger & Sons, DBA Bodger Seeds Ltd.)[2]	10.00	0.00506
(Transferred to Crown City Plating Co.)[2]	-10.00	-0.00506
	0.00	**0.00000**
Anderson Family Marital Trust[3]		
(Successor to Anderson, Ray L. and Helen T.)[2]	50.16	0.02538
(Transferred to:		
Brondino, Jeanne	-25.08	-0.01269
Heinrich, Carolyn)[2]	-25.08	-0.01269
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Anderson, Ray[3]		
(Successor to Covina Valley Unified School District)[2]	50.16	0.02538
(Transferred to Anderson, Ray L. and Helen T.)[2]	-50.16	-0.02538
	0.00	**0.00000**
Anderson, Ray L. and Helen T.[3]		
(Successor to Anderson, Ray)[2]	50.16	0.02538
(Transferred to Anderson Family Marital Trust)[2]	-50.16	-0.02538
	0.00	**0.00000**
Andrade, Macario and Consuelo; and Andrade, Robert and Jayne [3]		
(Successor to J. F. Isbell Estate, Inc.)[2]	8.36	0.00423
(Transferred to Susan Andrade)[2]	-8.36	-0.00423
	0.00	**0.00000**
Andrade, Susan[3]		
(Successor to Andrade, Macario and Consuelo; and Andrade, Robert and Jayne)[2]	8.36	0.00423
	8.36	**0.00423**
Arcadia, City of	9,252.00	4.68137
(Successor to First National Finance Corporation)[2]	60.90	0.03081
(Transferred to City of Monrovia)[2]	-951.00	-0.48119
	8,361.90	**4.23099**
Associated Southern Investment Company	16.50	0.00335
(Transferred to Southern California	-16.50	-0.00335
Edison Company)[2]	**0.00**	**0.00000**
AZ-Two, Inc.[3]	--	--
(See Southdown, Inc.)		
Azusa Associates, LLC[3]		
(Successor to Snyder, Esther)[2]	18.51	0.00937
(Transferred to Aqua Capital Management LP)[2]	-18.51	-0.00937
	0.00	**0.00000**
Azusa-Western Inc.	742.00	0.37544
(Transferred to Southwestern Portland Cement Co.)[2]	-742.00	-0.37544
	0.00	**0.00000**
Bahnsen & Beckman Ind., Inc.	840.50	0.42528
(Transferred to Woodland, Richard)[2]	-840.50	-0.42528
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Bahnsen, Betty M.	441.90	0.22359
(Transferred to Dawes, Mary Kay)[2]	-441.90	-0.22359
	0.00	**0.00000**
Baldwin Park County Water District	--	--
(See Valley County Water District)		
Bandel Family Trust[3]		
(Successor to Garnier, Camille A, Deceased, Estate of)[2]	16.70	0.00845
	16.70	**0.00845**
Banks, Gale C. and Vicki Lynn[3]		
(Successor to Doyle, Mr. and Mrs.; and Madruga, Mr. and Mrs.)[2]	50.00	0.02530
	50.00	**0.02530**
Base Line Water Company	430.20	0.21767
(Transferred to Hughes Development Corporation)[2]	-430.20	-0.21767
	0.00	**0.00000**
Beverly Acres Mutual Water Company	--	--
(See Beverly Acres Mutual Water Users Association)		
Beverly Acres Mutual Water Users Association	93.00	0.04706
(Formerly Beverly Acres Mutual Water Company)		
(Transferred to:		
San Gabriel Valley Water Company;	-50.00	-0.02530
Nicholson Trust)[2]	-43.00	-0.02176
	0.00	**0.00000**
Birenbaum, Max	6.00	0.00304
(Held in common with Birenbaum, Sylvia; Schneiderman, Alan; Schneiderman, Lydia; Wigodsky, Bernard; Wigodsky, Estera)		
(Transferred to City of Whittier)[2]	-6.00	-0.00304
	0.00	**0.00000**
Birenbaum, Sylvia	--	--
(See Birenbaum, Max)		
Blue Diamond Concrete Materials Div., The Flintkote Company	1,399.33	0.70804
(Transferred to Sully-Miller Contracting Co.)[2]	-1,399.33	-0.70804
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Bodger & Sons DBA Bodger Seeds Ltd.	10.00	0.00506
(Transferred to Anchor Plating Co., Inc.)[2]	-10.00	-0.00506
	0.00	**0.00000**
Botello Water Company	**0.00**	**0.00000**
Brezina, Raymond W. and Susan W. Trust 2001[3]	**0.00**	**0.00000**
Brondino, Jeanne[3]		
(Successor to Anderson Family Marital Trust)[2]	25.08	0.01269
	25.08	**0.01269**
Burbank Development Company	50.85	0.02563
(Transferred to Wright, Darrell A., Wright, Merle M. & Carlson, Jeanne W.)[2]	-50.85	-0.02563
	0.00	**0.00000**
Cadway, Inc.[3]		
(Successor to:		
Corcoran, Jack S. and R. L.	100.00	0.05060
Corcoran, Jack S. and R. L.	100.00	0.05060
Corcoran, Jack S. and R. L.	273.50	0.13839
Corcoran, Jack S. and R. L.	30.00	0.01518
Garnier, Janus	203.00	0.10272
Sloan Ranches	129.60	0.06558
Corcoran, Jack S. and R.L.)[2]	243.50	0.12320
(Transferred to:		
California Domestic Water Company	-243.50	-0.12321
California Domestic Water Company	-129.60	-0.06558
California Domestic Water Company)[2]	-63.30	-0.03203
	643.20	**0.32545**
Cal Fin	118.10	0.05976
(Transferred to Suburban Water Systems)[2]	-118.10	-0.05976
	0.00	**0.00000**
California-American Water Company (San Marino System)	**7,868.70**	**3.98144**
California Country Club[3] (Formerly CCC Management)	**0.00**	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
California Domestic Water Company	11,024.82	5.57839
(Successor to:		
Cantrill Mutual Water Company[1]	42.50	0.02150
Industry Properties, Ltd.[2]	73.50	0.03719
Modern Accent Corporation[2]	256.86	0.12997
Fisher, Russell[2]	19.00	0.00961
Graveline, George Wayne and Alexis June, Trust[2]	216.60	0.10959
Cadway, Inc.[2]	243.50	0.12321
Cadway, Inc[2]	129.60	0.06558
Cadway, Inc.[2])	63.30	0.03203
	12,069.68	**6.10707**
California Materials Company	**0.00**	**0.00000**
CalMat	--	--
(Formerly Conrock Company)		
(See Vulcan Materials Company)		
Cantrill Mutual Water Company	**0.00**	**0.00000**
(Transferred to California Domestic Water Company)[1]		
Canyon Water Company [3]		
(Successor to McIntyre, William)[2]	1.00	0.00051
	1.00	**0.00051**
Canyon Water & Development Corporation[3]	**0.00**	**0.00000**
CCC Management [3]	--	--
(See California Country Club)		
Cedar Avenue Mutual Water Company	121.10	0.06127
(Transferred to San Gabriel Valley Water Company)[2]	-121.10	-0.06127
	0.00	**0.00000**
CEMEX California Aggregates, Inc. [3]	--	--
(Formerly Southdown)		
Champion Mutual Water Company	**147.68**	**0.07472**
Chevron U.S.A.	**2.00**	**0.00101**
(Formerly Standard Oil of California)		
Chronis, Christine[3]	--	--
(See Polopolus, et al.)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Clayton Manufacturing Company	511.80	0.25896
(Transferred to City of Glendora)[2]	-511.80	-0.25896
	0.00	**0.00000**
Coiner, James W., dba Coiner Nursery[3]	--	--
Collison, E. O.	**0.00**	**0.00000**
Comby, Erma M.	--	--
(See Wilmott, Erma M.)		
Conrock Company	--	--
(See CalMat)		
(Formerly Consolidated Rock Products Co.)		
Consolidated Rock Products Co.	--	--
(See Conrock Company)		
Corcoran, Jack S.	747.00	0.37797
(Held in common with Corcoran, R. L.)		
(Transferred to:		
Cadway, Inc.	-100.00	-0.05060
Cadway, Inc.	-100.00	-0.05060
Cadway, Inc.	-273.50	-0.13839
Cadway, Inc.	-30.00	-0.01518
Cadway, Inc.)[2]	-243.50	-0.12320
	0.00	**0.00000**
Corcoran, R. L.	--	--
(See Corcoran, Jack S.)		
County Sanitation District No. 18 of Los Angeles County	**4.50**	**0.00228**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Covell, et al.	111.05	0.05619
(Successor to Rittenhouse, Catherine and Rittenhouse, James)[1]		
(Held in common with Tate, Phillip G. and Sieglinde A.; Goedert, Lillian E.; Goedert, Marion W.; Lakin, Kendall R.; Lakin, Kelly R.; Snyder, Harry; Snyder, Esther)		
(Transferred to:		
Lakin, Kelly R.	-9.26	-0.00468
Goedert, Lillian E.	-9.26	-0.00468
Tate, Phillip G. and Sieglinde A.	-57.83	-0.02926
Snyder, Esther	-18.51	-0.00937
Aqua Capital Management LP)[2]	-16.19	-0.00820
	0.00	**0.00000**
Covina, City of	2,507.89	1.26895
(Transferred to:		
Covina Irrigating Company	-1,734.00	-0.87737
Covina Irrigating Company)[2]	-300.00	-0.15179
	473.89	**0.23979**
Covina-Valley Unified School District	50.16	0.02538
(Transferred to Anderson, Ray)[2]	-50.16	-0.02538
	0.00	**0.00000**
Crevolin, A. J.	**2.25**	**0.00114**
Crocker National Bank, Executor of the Estate of A. V. Handorf	**0.00**	**0.00000**
(Transferred to Modern Accent Corp.)[1]		
Cross Water Company	1,103.00	0.05581
(Transferred to Industry Waterworks System, City of)[2]	-1,103.00	-0.05581
	0.00	**0.00000**
Crown City Plating Company	190.00	0.09614
(Successor to Anchor Plating Co., Inc.)[2]	10.00	0.00506
(Transferred to Valencia Heights Water Company)[2]	-200.00	-0.10120
	0.00	**0.00000**
Davidson Optronics, Inc.	22.00	0.01113
(Transferred to Covina Irrigating Company)[2]	-22.00	-0.01113
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Dawes, Mary Kay[3]	**441.90**	**0.22359**
(Successor to Bahnsen, Betty M.)[2]		
Del Rio Mutual Water Company	**199.00**	**0.10069**
Denton, Kathryn W., Trustee for San Jose Ranch Company	185.50	0.09386
(Transferred to White, June G., Trustee of the June G. White share of the Garnier Trust)[2]	-185.50	-0.09386
	0.00	**0.00000**
Doyle, Mr. and Mrs.; and Madruga, Mr. and Mrs.[3]		
(Successor to Sawpit Farms, Limited)[2]	50.00	0.02530
(Transferred to Banks, Gale C. and Vicki Lynn)[2]	-50.00	-0.02530
	0.00	**0.00000**
Driftwood Dairy	**163.80**	**0.08288**
Duhalde, L.	**0.00**	**0.00000**
(Transferred to El Monte Union High School District)[1]		
Dunning, George		
(Held in common with Dunning, Vera H.)		
(Successor to Vera H. Dunning)[2]	324.00	0.16394
(Transferred to Dunning Trust, George A. V.)[2]	-324.00	-0.16394
	0.00	**0.00000**
Dunning Trust, George A. V. [3]		
(Successor to Dunning, George)[2]	324.00	0.16394
(Transferred to Loyola Marymount University)[2]	-324.00	-0.16394
	0.00	**0.00000**
Dunning, Vera H.	324.00	0.16394
(See Dunning, George)		
(Transferred to Dunning, George)[2]	-324.00	-0.16394
	0.00	**0.00000**
Durfee Property, LLC[3]		
(Successor to Texaco, Inc.)[2]	50.00	0.02530
(Transferred to San Gabriel Valley Water Company)[2]	-50.00	-0.02530
	0.00	**0.00000**
East Pasadena Water Company, Ltd.	**1,407.69**	**0.71227**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Eckis, Rollin[3]		
(Successor to Sawpit Farms, Limited)[2]	123.00	0.06224
(Transferred to City of Monrovia)[2]	-123.00	-0.06224
	0.00	**0.00000**
El Encanto Properties	33.40	0.01690
(Transferred to La Puente Valley County Water District)[2]	-33.40	-0.01690
	0.00	**0.00000**
El Monte, City of	2,784.23	1.40878
(Successor to W. E. Hall Company)[2]	0.20	0.00010
	2,784.43	**1.40888**
El Monte Cemetery Association	**18.50**	**0.00936**
El Monte Union High School District	9.80	0.00496
(Successor to Duhalde, L.)[1]	6.40	0.00324
(Transferred to City of Whittier)[2]	-16.20	-0.00820
	0.00	**0.00000**
Everett, Mrs. Alda B. (Held in common with Everett, W.B., Executor of the Estate of I. Worth Everett)	**0.00**	**0.00000**
Everett, W.B., Executor of the Estate of I. Worth Everett (See Everett, Mrs. Alda B.)	--	--
Faix, Incorporated (Successor to Frank F. Pellissier & Sons, Inc.)[1] (Transferred to Faix, Ltd.)[1]	**0.00**	**0.00000**
Faix, Ltd.	6,490.00	3.28384
(Successor to Faix, Incorporated)[1]		
(Transferred to Pellissier Irrevocable QTIP Trust, et al, Laurence R., Co-tenancy of)[2]	-6,490.00	-3.28384
	0.00	**0.00000**
First National Finance Corporation	60.90	0.03081
(Transferred to City of Arcadia)[2]	-60.90	-0.03081
	0.00	**0.00000**
Fisher, Russell	19.00	0.00961
(Held in common with Hauch, Edward and Warren, Clyde)		
(Transferred to California Domestic Water Company)[2]	-19.00	-0.00961
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Fox Family Trust Michael Edward Fox and Crystal Marie Fox, Trustees[3]		
(Successor to Maggiore, Valarie; Fox, Crystal; and Kirklen, Jeffery)[2]	**145.83**	**0.07378**
Frank F. Pellissier & Sons, Inc.	**0.00**	**0.00000**
(Transferred to Faix, Incorporated)[1]		
Fruit Street Water Company	207.00	0.10474
(Transferred to:		
Gifford, Brooks, Jr.,	-101.29	-0.05125
City of La Verne)[2]	-105.71	-0.05349
	0.00	**0.00000**
Garnier, Anton C. and Anita, Family Trust[3]		
(Successor to:		
South Covina Water Service	203.00	0.10271
Garnier, Camille A., Deceased, Estate of	8.30	0.00420
Garnier, Janus)[2]	3.00	0.00152
	214.30	**0.10843**
Garnier, Camille A., Deceased, Estate of[3]		
(Successor to South Covina Water Service)[2]	83.30	0.04215
(Transferred to:		
The Ruth Elaine Ailor Garnier Trust	-41.70	-0.02110
The George Wayne and Alexis June Graveline Trust	-8.30	-0.00420
The Anton C. and Anita Garnier Family Trust	-8.30	-0.00420
Janus Garnier	-8.30	-0.00420
The Bandel Family Trust)[2]	-16.70	-0.00845
	0.00	**0.00000**
Garnier, Janus[3]		
(Successor to :		
Garnier, Camille A. Deceased, Estate of	8.30	0.00420
South Covina Water Service)[2]	203.00	0.10272
(Transferred to:		
George Wayne and Alexis June Graveline Trust	-5.30	-0.00268
The Anton C. and Anita Garnier Family Trust	-3.00	-0.00152
Cadway, Inc.)[2]	-203.00	-0.10272
	0.00	**0.00000**
Garnier, Ruth Elaine Ailor, Trust[3]		
(Successor to Garnier, Camille A. Deceased, Estate of)[2]	41.70	0.02110
	41.70	**0.02110**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Gates, James Richard[3]	**0.00**	**0.00000**
Gifford, Brooks, Jr.[3]		
(Successor to:		
Fruit Street Water Company,	101.29	0.05125
Mission Gardens Mutual Water Company)[2]	96.96	0.04906
(Transferred to City of Whittier)[2]	-198.25	-0.10031
	0.00	**0.00000**
Gilkerson, Frank B.	**--**	**--**
(Formerly part of Covell, et al.)		
(Transferred interest in Covell, et al. to Jobe, Darr)[2]		
Glendora Unified High School District	99.00	0.05009
(Transferred to City of Glendora)[2]	-99.00	-0.05009
	0.00	**0.00000**
Goedert, Lillian E.		
(See Covell, et al.)		
(Successor to Covell, et al.)[2]	9.26	0.00468
(Transferred to Covina Irrigating Co.)[2]	-7.00	-0.00354
	2.26	**0.00114**
Goedert, Marion W.	**--**	**--**
(See Covell, et al.)		
Golden State Water Company,	**5,773.00**	**2.92105**
San Gabriel Valley District		
(Formerly Southern California Water Company)		
Graham, William	**--**	**--**
(Formerly part of Covell, et al.)		
(Transferred interest in Covell et al. to Jobe, Darr)[2]		
Graveline, George Wayne and Alexis June, Trust[3]		
(Successor to:		
South Covina Water Service	203.00	0.10271
Garnier, Camille A., Deceased, Estate of	8.30	0.00420
Garnier, Janus)[2]	5.30	0.00268
(Transferred to California Domestic Water Company)[2]	-216.60	-0.10959
	0.00	**0.00000**
Green, Walter	**71.70**	**0.03628**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Grizzle, Lissa B.	184.00	0.09310
(Held in common with Grizzle, Mervin A.; Wilson, Harold R.; Wilson, Sarah C.)		
(Transferred to City of Whittier)[2]	-184.00	-0.09310
	0.00	**0.00000**
Grizzle, Mervin A.	--	--
(See Grizzle, Lissa B.)		
Hansen, Alice	**0.75**	**0.00038**
Hanson Aggregates West, Inc. [3]		
(Successor to:		
Livingston-Graham, Inc.	1,824.40	0.92312
Sully-Miller Contracting Company)[2]	489.77	0.24782
	2,314.17	**1.17094**
Hartley, David[3]	**0.00**	**0.00000**
Hauch, Edward	--	--
(See Fisher, Russell)		
Heinrich, Carolyn[3]		
(Successor to Anderson Family Marital Trust)[2]	25.08	0.01269
	25.08	**0.01269**
Hemlock Mutual Water Company	**166.00**	**0.08399**
Hollenbeck Street Water Company	**0.00**	**0.00000**
(Transferred to Suburban Water Systems)[1]		
Hughes Development Corporation[3]		
(Successor to Base Line Water Company)[2]	430.20	0.21767
(Transferred to:		
San Gabriel County Water District	-400.00	-0.20239
San Gabriel County Water District)[2]	-30.20	-0.01528
	0.00	**0.00000**
Hunter, Lloyd F.[3]		
(Successor to Wade, R.)[2]	4.40	0.00223
(Transferred to Covina Irrigating Company)[2]	-4.40	-0.00223
	0.00	**0.00000**
Hydro-Conduit Corporation	**0.00**	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Industry Waterworks System, City of[3]		
(Successor to Cross Water Company)[2]	1,103.00	0.55810
	1,103.00	**0.55810**
Industry Properties, Ltd.		
(Successor to A & E Plastik Pak Co., Inc.)[1]	73.50	0.03719
(Transferred to California Domestic Water Co.)[2]	-73.50	-0.03719
	0.00	**0.00000**
Irwindale, City of[3]		
(Successor to United Concrete Pipe Corporation)[2]	376.00	0.19025
	376.00	**0.19025**
J. F. Isbell Estate, Inc.	8.36	0.00423
(Transferred to Andrade, Macario and	-8.36	-0.00423
Consuelo; and Andrade, Robert and Jayne)[2]	**0.00**	**0.00000**
Jerris, Helen[3]	--	--
(See Polopolus, et al.)		
Jobe, Darr[3]	--	--
(Formerly part of Covell, et al.)		
(Successor to:		
Gilkerson, Frank B. interest in Covell et al.		
Graham, William interest in Covell et al.)[2]		
(Transferred interest in Covell et al. to Tate, Phillip G. and Sieglinde A.)[2]		
Kirklen Family Trust[3]	375.00	0.18974
(Formerly Kirklen, Dawn L.)		
(Held in common with Kirklen, William R.)		
(Successor to San Dimas-La Verne	62.50	0.03162
Recreational Facilities Authority)[2]		
(Transferred to		
Maggiore, Valarie; Fox, Crystal; and Kirklen, Jeffery)[2]	-437.50	-0.22136
	0.00	**0.00000**
Kirklen, Dawn L.	--	--
(See Kirklen Family Trust)		
Kirklen, Jeffery[3]	**145.84**	**0.07379**
(Successor to Maggiore, Valarie; Fox, Crystal; and Kirklen, Jeffery)[2]		
Kirklen, William R.	--	--
(See Kirklen, Dawn L.)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Kiyan Farms	30.00	0.01518
(Formerly Kiyan, Hideo)		
(Transferred to West Covina Venture, Ltd.)[2]	-30.00	-0.01518
	0.00	**0.00000**
Kiyan, Hideo	--	--
(See Kiyan Farms)		
(Held in common with Kiyan, Hiro)		
Kiyan, Hiro	--	--
(See Kiyan, Hideo)		
Knight, Kathryn M.[3]		
(Successor to Knight, William)[2]	227.88	0.11530
(Transferred to Knight, William)[2]	-227.88	-0.11530
	0.00	**0.00000**
Knight, William	227.88	0.11530
(Transferred to Knight, Kathryn M.)[2]	-227.88	-0.11530
(Successor to Knight, Kathryn M.)[2]	227.88	0.11530
	227.88	**0.11530**
Lakin, Kelly R.[3]		
(See Covell, et al.)		
(Successor to Covell, et al.)[2]	9.26	0.00468
(Transferred to:		
Covina Irrigating Co.	-6.03	-0.00305
Covina Irrigating Co.)[2]	-3.23	-0.00163
	0.00	**0.00000**
Lakin, Kendall R.[3]	--	--
(See Covell, et al.)		
Landeros, John	**0.75**	**0.00038**
La Grande Source Water Company	**0.00**	**0.00000**
(Transferred to Suburban Water Systems)[1]		
Lang, Frank	**0.00**	**0.00000**
(Transferred to San Dimas-La Verne Recreational Facilities Authority)[1]		
La Puente Cooperative Water Co.	**0.00**	**0.00000**
(Transferred to Suburban Water Systems)[1]		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
La Puente Valley County Water District	1,097.00	0.55507
(Successor to El Encanto Properties)[2]	33.40	0.01690
	1,130.40	**0.57197**
La Verne, City of	250.00	0.12650
(Successor to Fruit Street Water Co.)[2]	105.71	0.05349
(Transferred to Covina Irrigating Co.)[2]	-355.71	-0.17999
	0.00	**0.00000**
Lee, Paul M. and Ruth A.; Nasmyth, Virginia; Nasmyth, John[3]	**0.00**	**0.00000**
Little John Dairy	**0.00**	**0.00000**
Livingston-Graham, Inc.	1,824.40	0.92312
(Transferred to Hanson Aggregates West, Inc.)[2]	-1,824.40	-0.92312
	0.00	**0.00000**
Los Flores Mutual Water Company	26.60	0.01346
(Transferred to City of Monterey Park)[2]	-26.60	-0.01346
	0.00	**0.00000**
Loucks, David	**3.00**	**0.00152**
Lovelady, June G., Trustee[3]		
(Successor to White, June G., Trustee of the June G. White Share of the Garnier Trust)[2]	185.50	0.09386
	185.50	**0.09386**
Loyola Marymount University[3]		
(Successor to George A.V. Dunning Trust)[2]	324.00	0.16394
(Transferred to City of Glendora)[2]	-324.00	-0.16394
	0.00	**0.00000**
Maggiore, Valarie[3]		
(Successor to Maggiore, Valarie; Fox, Crystal; and Kirklen, Jeffrey)[2]	**145.83**	**0.07379**
Maggiore, Valarie; Fox, Crystal; and Kirklen, Jeffery[3]		
(Successor to Kirklen Family Trust)[2]	437.50	0.22136
(Transferred to:		
(Maggiore, Valarie;	-145.83	-0.07379
Kirklen, Jeffrey;	-145.84	-0.07379
Fox Family Trust, Michael Edward Fox	-145.83	-0.07378
and Crystal Marie Fox, Trustees)[2]	**0.00**	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Manning Bros. Rock & Sand Co.	328.00	0.16596
(Transferred to Conrock Company)[2]	-328.00	-0.16596
	0.00	**0.00000**
Maple Water Company	118.50	0.05996
(Transferred to Southwest Water Co.)[2]	-118.50	-0.05996
	0.00	**0.00000**
Martinez, Frances Mercy	**0.75**	**0.00038**
(Held in common with Martinez, Jaime)		
Martinez, Jaime	--	--
(See Martinez, Frances Mercy)		
Massey-Ferguson Company	**0.00**	**0.00000**
McIntyre, William[3]		
(Successor to West Covina Venture, Ltd.)[2]	30.00	0.01518
(Transferred to Canyon Water Company)[2]	-1.00	-0.00051
	29.00	**0.01467**
Miller Brewing Company	111.01	0.05617
(Successor to:		
Maechtlen, Estate of J.J.	151.50	0.07666
Phillips, Alice B., et al.	50.00	0.02530
South Covina Water Service	300.00	0.15180
Woodland Farms	919.50	0.46526
Woodland, Richard)[2]	840.50	0.42528
(Transferred to Miller Breweries West, L.P.)[2]	-2,372.51	-1.20047
	0.00	**0.00000**
Miller Breweries West, L.P.[3]		
(Successor to Miller Brewing Company)[2]	2,372.51	1.20047
(Transferred to MillerCoors LLC)[2]	-2,372.51	-1.20047
	0.00	**0.00000**
MillerCoors LLC[3]		
(Successor to Miller Breweries West, L.P.)[2]	**2,372.51**	**1.20047**
Mission Gardens Mutual Water Company	96.96	0.04906
(Transferred to Gifford, Brooks, Jr.)[2]	-96.96	-0.04906
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Modern Accent Corporation		
(Successor to Crocker National Bank,	256.86	0.12997
Executor of the Estate of A. V. Handorf)[1]		
(Transferred to California Domestic Water Co.)[2]	-256.86	-0.12997
	0.00	**0.00000**
Monterey Park, City of	6,677.48	3.37870
(Successor to Los Flores Mutual Water Co.)[2]	26.60	0.01346
	6,704.08	**3.39216**
Munoz, Ralph E. [3]	**0.00**	**0.00000**
Murphy Ranch Mutual Water Company	223.23	0.11295
(Transferred to Southwest Suburban Water)[2]	-223.23	-0.11295
	0.00	**0.00000**
Namimatsu Farms	196.00	0.09917
(Transferred to California Cities Water Co.)[2]	-196.00	-0.09917
	0.00	**0.00000**
Nick Tomovich & Sons	**0.02**	**0.00001**
Nicholson Trust[3]		
(Successor to Beverly Acres	43.00	0.02176
Mutual Water Users Association)[2]		
(Transferred to:		
Nicholson Family Trust	-7.00	-0.00354
Nicholson Trust, Helene S.)[2]	-12.00	-0.00607
	24.00	**0.01215**
Nicholson Family Trust[3]		
(Successor to Nicholson Trust)[2]	7.00	0.00354
	7.00	**0.00354**
Nicholson Trust, Helene S.[3]		
(Successor to Nicholson Trust)[2]	12.00	0.00607
(Transferred to San Gabriel Valley Water Co.)[2]	-12.00	-0.00607
	0.00	**0.00000**
New Owl Rock Products[3]		
(Successor to Owl Rock Products Co.)[2]	715.60	0.36208
(Transferred to Robertson's Ready Mix, Ltd.)[2]	-715.60	-0.36208
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
No. 17 Walnut Place Mutual Water Co.	21.50	0.01088
(Transferred to San Gabriel Valley Water Co.)[2]	-21.50	-0.01088
	0.00	**0.00000**
Orange Production Credit Association[3]	**0.00**	**0.00000**
Owl Rock Products Co.	715.60	0.36208
(Transferred to New Owl Rock Products)[2]	-715.60	-0.36208
	0.00	**0.00000**
Pacific Rock & Gravel Co.	408.00	0.20644
(Transferred to:	-208.00	-0.10524
City of Whittier,	-200.00	-0.10120
Rose Hills Memorial Park Association)[2]	**0.00**	**0.00000**
Park Water Company	184.01	0.09311
(Transferred to Valley County Water District)[2]	-184.01	-0.09311
	0.00	**0.00000**
Parton Family Trust[3]	46.20	0.02338
(Formerly Via, H., Trust of)[2]		
(Transferred to San Gabriel Valley Water Company)[2]	-46.20	-0.02338
	0.00	**0.00000**
Pellissier Irrevocable QTIP Trust, et al, Laurence R., Co-tenancy of[3]		
(Successor to Faix, Ltd)[2]	6,490.00	3.28384
	6,490.00	**3.28384**
Penn, Margaret[3]	--	--
(See Polopolus, et al.)		
Pico County Water District	**0.75**	**0.00038**
Polopolus, John[3]	--	--
(See Polopolus, et al.)		
Polopolus, et al.[3]		
(Successor to Polopolus, Steve)[2]	22.50	0.01138
(Held in common with Chronis, Christine; Jerris, Helen; Penn, Margaret; Polopolus, John)	**22.50**	**0.01138**
Polopolus, Steve	22.50	0.01138
(Transferred to Polopolus, et al.)[2]	-22.50	-0.01138
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Rados, Alexander	**43.00**	**0.02176**
(Held in common with Rados, Stephen and Rados, Walter)		
Rados, Stephen	--	--
(See Rados, Alexander)		
Rados, Walter	--	--
(See Rados, Alexander)		
Richwood Mutual Water Company	192.60	0.09745
(Transferred to San Gabriel Valley Water Company)[2]	-192.60	-0.09745
	0.00	**0.00000**
Rincon Ditch Company	628.00	0.31776
(Transferred to Workman Mill Investment Company)[2]	-628.00	-0.31776
	0.00	**0.00000**
Rincon Irrigation Company	314.00	0.15888
(Transferred to Workman Mill Investment Company)[2]	-314.00	-0.15888
	0.00	**0.00000**
Rio Hondo Memorial Foundation, The[3]	--	--
(Formerly Rose Hills Foundation, The)		
(See Rose Hills Foundation, The)		
Rittenhouse, Catherine	**0.00**	**0.00000**
(Transferred to Covell, Ralph)[1]		
Rittenhouse, James	**0.00**	**0.00000**
(Transferred to Covell, Ralph)[1]		
Robertson's Ready Mix, Ltd.[3]		
(Successor to New Owl Rock Products)[2]	715.60	0.36208
(Transferred to San Gabriel County Water District)[2]	-715.60	-0.36208
	0.00	**0.00000**
Rose Hills Memorial Park Association	--	--
(See Rose Hills Foundation, The)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Rose Hills Foundation, The [3]		
(Formerly Rose Hills Memorial Park Association)		
(See Rio Hondo Memorial Foundation, The)		
(Formerly Rio Hondo Memorial Foundation, The)	594.00	0.30055
(Successor to Pacific Rock & Gravel Co.)[2]	200.00	0.10120
(Transferred to:		
Workman Mill Investment Co.	-594.00	-0.30055
Workman Mill Investment Co.)[2]	-200.00	-0.10120
	0.00	**0.00000**
Rosemead Development, Ltd.[3]		
(Successor to Thompson, Earl W.)[2]	1.00	0.00051
	1.00	**0.00051**
Rurban Homes Mutual Water Company	**217.76**	**0.11018**
Ruth, Roy	**0.75**	**0.00038**
San Dimas Golf Inc. DBA Via Verde County Club[3]	**0.00**	**0.00000**
San Dimas-La Verne Recreational Facilities Authority		
(Successor to Lang, Frank)[1]	62.50	0.03162
(Transferred to Kirklen, Dawn L. and William R.)[2]	-62.50	-0.03162
	0.00	**0.00000**
San Gabriel Country Club	**286.10**	**0.14476**
San Gabriel County Water District	4,250.00	2.15044
(Successor to:		
Hughes Development Corporation	400.00	0.20239
Hughes Development Corporation	30.20	0.01528
Robertson's Ready Mix, Ltd.)[2]	715.60	0.36208
	5,395.80	**2.73019**
San Gabriel Valley Municipal Water District	**0.00**	**0.00000**
Sawpit Farms, Limited	173.00	0.08754
(Transferred to:		
Eckis, Rolin	-123.00	-0.06224
Doyle and Madruga)[2]	-50.00	-0.02530
	0.00	**0.00000**
Schneiderman, Alan	--	--
(See Birenbaum, Max)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Schneiderman, Lydia	--	--
(See Birenbaum, Max)		
Security Pacific National Bank,	38.70	0.01958
Co-trustee for the Estate of Winston F. Stoody		
(See Stoody, Virginia A.)		
(Transferred to City of Whittier)[2]	-38.70	-0.01958
	0.00	**0.00000**
Sierra La Verne Country Club[3]	**0.00**	**0.00000**
Sierra Madre, City of	**0.00**	**0.00000**
Sloan Ranches	129.60	0.06558
(Transferred to Cadway, Inc.)[2]	-129.60	-0.06558
	0.00	**0.00000**
Smith, Charles[3]	**0.00**	**0.00000**
Snyder, Esther[3]		
(Successor to Covell, et al)[2]	18.51	0.00937
(Transfered to Azusa Associates, LLC)[2]	-18.51	-0.00937
	0.00	**0.00000**
Snyder, Harry	--	--
(See Covell, et al.)		
Sonoco Products Company	**311.60**	**0.15766**
South Covina Water Service	992.30	0.50209
(Transferred to:		
Miller Brewing Company	-300.00	-0.15180
Anton C. and Anita Garnier Family Trust	-203.00	-0.10271
The George Wayne and Alexis June Graveline Trust	-203.00	-0.10271
The Estate of Camille A. Garnier, Deceased	-83.30	-0.04215
Garnier, Janus)[2]	-203.00	-0.10272
	0.00	**0.00000**
Southdown, Inc.[3]	--	--
(Formerly AZ-Two, Inc.)		
(See CEMEX California Aggregates, Inc.)		
Southern California Edison Company	155.25	0.07855
(Successor to Associated		
Southern Investment Company)[2]	16.50	0.00835
	171.75	**0.08690**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Southern California Water Company,	--	--
San Gabriel Valley District		
(See Golden State Water Company, San Gabriel Valley District)		
South Pasadena, City of	**3,567.70**	**1.80520**
Southwest Suburban Water	--	--
(See Suburban Water Systems)		
Southwest Water Company [3]		
(Successor to Maple Water Company)[2]	118.50	0.05996
	118.50	**0.05996**
Southwestern Portland Cement Company[3]		
(Successor to Azusa Western, Inc.)[2]	742.00	0.37544
(Transferred to American Sheds, Inc.)[2]	-742.00	-0.37544
	0.00	**0.00000**
Speedway 605, Inc.[3]	**0.00**	**0.00000**
Standard Oil Company of California	--	--
(See Chevron U.S.A.)		
Sterling Mutual Water Company	**120.00**	**0.06072**
Stoody, Virginia A., Co-trustee for the	--	--
Stoody, Winston F., Estate of	--	--
(See Security Pacific National Bank, Co-trustee)		
Suburban Water Systems	20,462.47	10.35370
(Formerly Southwest Suburban Water)		
(Successor to:		
Hollenbeck Street Water Company[1]	646.39	0.32706
La Grande Source Water Company[1]	1,078.00	0.54545
La Puente Cooperative Water Co.[1]	1,210.90	0.61270
Valencia Valley Water Company[1]	651.50	0.32965
Victoria Mutual Water Company[1]	469.60	0.23761
Cal Fin[2]	118.10	0.05976
Murphy Ranch Mutual Water Co.[2])	223.23	0.11295
	24,860.19	**12.57888**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Sully-Miller Contracting Company[3]		
(Successor to Blue Diamond Concrete Materials Div., The Flintkote Company)[2]	1,399.33	0.70804
(Transferred to:		
United Rock Products Corporation	-909.56	-0.46022
Hanson Aggregates West, Inc.)[2]	-489.77	-0.24782
	0.00	**0.00000**
Sunny Slope Water Company	**2,228.72**	**1.12770**
Tate, Phillip G. and Sieglinde A.[3]	**57.83**	**0.02926**
(See Covell,et al.)		
(Successor to Jobe, Darr interest in Covell, et al.)[2]		
(Successor to Covell, et al.)[2]		
Taylor Herb Garden	6.00	0.00304
(Transferred to Covina Irrigating Company)[2]	-6.00	-0.00304
	0.00	**0.00000**
Texaco, Inc. (Chevron U.S.A., Inc.)	50.00	0.02530
(Transferred to Durfee Property, LLC)[2]	-50.00	-0.02530
	0.00	**0.00000**
Thompson, Earl W.	1.00	0.00051
(Held in common with Thompson, Mary)		
(Transferred to Rosemead Development, Ltd.)[2]	-1.00	-0.00051
	0.00	**0.00000**
Thompson, Mary	**--**	**--**
(See Thompson, Earl W.)		
Tran, Hieu[3]	**0.00**	**0.00000**
Tyler Nursery	**3.21**	**0.00162**
United Concrete Pipe Corporation	376.00	0.19025
(Transferred to Irwindale, City of)[2]	-376.00	-0.19025
	0.00	**0.00000**
United Rock Products Corporation[3]		
(Successor to:		
Sully Miller Contracting Company)[2]	909.56	0.46022
	909.56	**0.46022**
USA Waste of California, Inc.[3]		
(Successor to American Sheds, Inc.)[2]	742.00	0.37544
(Transferred to Aqua Capital Management LP)[2]	-742.00	-0.37544
	0.00	**0.00000**

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
U.S. Pipe & Foundry Company[3]	--	--
(See United Concrete Pipe Corporation)		
Valencia Heights Water Company	861.00	0.43565
(Successor to Crown City Plating Company)[2]	200.00	0.10120
	1,061.00	**0.53685**
Valencia Valley Water Company	**0.00**	**0.00000**
(Transferred to Suburban Water Systems)[1]		
Vallecito Water Company	2,867.00	1.45066
(Transferred to San Gabriel Valley	-2,867.00	-1.45066
Water Company)[2]	**0.00**	**0.00000**
Valley County Water District	5,775.00	2.92206
(Formerly Baldwin Park County Water District)		
(Successor to Park Water Company)[2]	184.01	0.09311
	5,959.01	**3.01517**
Valley Crating Company	**0.00**	**0.00000**
Valley View Mutual Water Company	**616.00**	**0.31169**
Via, H.	--	--
(See Via, H., Trust of)		
Via, H., Trust of	--	--
(Formerly Via, H.)		
(See Parton Family Trust)		
Victoria Mutual Water Company		
(Transferred to Suburban Water Systems)[1]	**0.00**	**0.00000**
Vietnamese American Buddhist Temple Congregation[3]	**0.00**	**0.00000**
Vulcan Materials Company		
(Formerly CalMat)		
(Successor to Manning Bros. Rock & Sand Co.)[2]	1,793.35	0.90740
	1,793.35	**0.90740**
Wade, R.	4.40	0.00223
(Transferred to Hunter, Lloyd F.)[2]	-4.40	-0.00223
	0.00	**0.00000**
Ward Duck Company	--	--
(See Woodland Farms, Inc.)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Warren, Clyde	--	--
(See Fisher, Russell)		
W. E. Hall Company	0.20	0.00010
(Transferred to City of El Monte)[2]	-0.20	-0.00010
	0.00	**0.00000**
West Covina Venture, Ltd.[3]		
(Successor to Kiyan Farms)[2]	30.00	0.01518
(Transferred to McIntyre, William)[2]	-30.00	-0.01518
	0.00	**0.00000**
White, June G., Trustee of the June G. White Share of the Garnier Trust[3]		
(Successor to Denton, Kathryn W., Trustee for the San Jose Ranch Company)[2]	185.50	0.09386
(Transferred to Lovelady, June G., Trustee)[2]	-185.50	-0.09386
	0.00	**0.00000**
Whittier, City of	7,620.23	3.85572
(Successor to:		
Grizzle, Lissa B.	184.00	0.09310
Pacific Rock and Gravel Co.	208.00	0.10524
Security Pacific National Bank, Co-trustee for the Estate of Winston F. Stoody	38.70	0.01958
El Monte Union High School District	16.20	0.00820
Gifford, Brooks, Jr.	198.25	0.10031
Birenbaum, Max)[2]	6.00	0.00304
	8,271.38	**4.18519**
Wigodsky, Bernard	--	--
(See Birenbaum, Max)		
Wigodsky, Estera	--	--
(See Birenbaum, Max)		
Wilmott, Erma M.	**0.75**	**0.00038**
(Formerly Comby, Erma M.)		
Wilson, Harold R.	--	--
(See Grizzle, Lissa B.)		
Wilson, Sarah C.	--	--
(See Grizzle, Lissa B.)		

PUMPER	PRESCRIPTIVE PUMPING ACRE-FEET	PUMPER'S SHARE %
Woodland Farms, Inc.	--	--
(See 6W Farms, Inc.)		
(Formerly Ward Duck Company)		
Woodland, Frederick G.[3]	--	--
Woodland, Richard[3]		
(Successor to Bahnsen & Beckman Ind., Inc.)[2]	840.50	0.42528
(Transferred to Miller Brewing Company)[2]	-840.50	-0.42528
(Successor to 6W Farms, Inc.)[2]	297.90	0.15073
(Transferred to Aqua Capital Management LP)[2]	-297.90	-0.15073
	0.00	**0.00000**
Workman Mill Investment Company[3]		
(Successor to:		
Rincon Ditch Company	628.00	0.31776
Rincon Irrigation Company	314.00	0.15888
Rose Hills Memorial Park Association	594.00	0.30055
Rose Hills Foundation, The)[2]	200.00	0.10120
	1,736.00	**0.87839**
Wright, Darrell A., Wright, Merle M. & Carlson, Jeanne W.[3]		
(Successor to Burbank Development Co.)[2]	50.65	0.02563
(Transferred to San Gabriel Valley Water Company)[2]	-50.65	-0.02563
	0.00	**0.00000**
Totals for Exhibit "D"	**129,765.87**	**65.65953**
Totals for Exhibit "E"	**67,868.56**	**34.34047**
GRAND TOTALS	**197,634.43**	**100.00000**

1/ Permanent transfer of rights as recorded at entry of Judgment.
2/ Permanent transfer of rights after entry of Judgment.
3/ Intervenor after Judgment.

EXHIBIT "E"

TABLE SHOWING PRODUCTION RIGHT OF EACH INTEGRATED PRODUCER AS OF JUNE 21, 2012

INTEGRATED PRODUCER	DIVERSION COMPONENT ACRE-FEET	PRESCRIPTIVE PUMPING COMPONENT ACRE-FEET	PUMPING COMPONENT SHARE %
Aqua Capital Management LP[3]			
(Successor to:			
Covell, Ralph	2.12	0.00	0.00000
Covell et al.	0.00	16.19	0.00820
Azusa Associates, LLC	0.00	18.51	0.00937
USA Waste of California, Inc.	0.00	742.00	0.37544
Richard Woodland)[2]	0.00	297.90	0.15073
	2.12	**1,074.60**	**0.54374**
Azusa, City of	0.00	3,655.99	1.84988
(Successor to Monrovia Nursery Company)[2]	363.00	0.00	0.00000
	363.00	**3,655.99**	**1.84988**
Azusa Agricultural Water Company	1,000.00	1,732.20	0.87647
(Transferred to:			
Azusa Valley Water Company	-830.00	-1,437.73	-0.72747
Azusa Valley Water Company)[2]	-170.00	-294.47	-0.14900
	0.00	**0.00**	**0.00000**
Azusa Foot-Hill Citrus Company	718.50	0.00	0.00000
(Transferred to Monrovia Nursery Company)[2]	-718.50		
	0.00	**0.00**	**0.00000**
Azusa Valley Water Company	2,422.00	8,274.00	4.18652
(Successor to:			
Azusa Agricultural Water Company	830.00	1,437.73	0.72747
Azusa Agricultural Water Company)[2]	170.00	294.47	0.14900
	3,422.00	**10,006.20**	**5.06299**
Brierly, Susan K.[3]			
(Successor to Monrovia Nursery Company)[2]	24.00	0.00	0.00000
(Transferred to Miles R. Rosedale)[2]	-8.00		
	16.00	**0.00**	**0.00000**
California-American Water Company	**1,672.00**	**3,649.00**	**1.84634**
(Duarte System)			

INTEGRATED PRODUCER	DIVERSION COMPONENT ACRE-FEET	PRESCRIPTIVE PUMPING COMPONENT ACRE-FEET	PUMPING COMPONENT SHARE %
California Cities Water Company	--	--	--
(See Southern California Water Company, San Dimas District)			
Covina Irrigating Company	2,514.00	4,140.00	2.09478
(Successor to:			
City of Covina		1,734.00	0.87737
City of Covina		300.00	0.15179
Taylor Herb Garden		6.00	0.00304
La Verne, City of		355.71	0.17999
Davidson Optronics, Inc.		22.00	0.01113
Goedert, Lillian		7.00	0.00354
Lakin, Kelly R.		6.03	0.00305
Hunter, Lloyd F.		4.40	0.00223
Lakin, Kelly R.)[2]		3.23	0.00163
	2,514.00	**6,578.37**	**3.32855**
CV Glendora 3 Site, LLC)[3]			
(Successor to:			
Rosedale, Miles R.	184.00	0.00	0.00000
Monrovia Nursery Company)[2]	10.00	0.00	0.00000
	194.00	**0.00**	**0.00000**
DeFalco, John and Carole[3]			
(Successor to Nickowitz, at al.)[2]	1.49	0.00	0.00000
	1.49	**0.00**	**0.00000**
Glendora, City of	17.00	8,258.00	4.17842
(Successor to:			
Maechtlen, Estate of J. J.		150.00	0.07590
Maechtlen, Trust of P. A.		50.00	0.02530
Ruebhausen, Arline	18.34		
Glendora Unified High School District		99.00	0.05009
Loyola Marymount University		324.00	0.16394
Clayton Manufacturing Company)[2]		511.80	0.25896
	35.34	**9,392.80**	**4.75261**
Golden State Water Company, San Dimas District[3]	500.00	3,242.53	1.64067
(Formerly California Cities Water Company)			
(Successor to Namimatsu Farms)[2]		196.00	0.09917
	500.00	**3,438.53**	**1.73984**

INTEGRATED PRODUCER	DIVERSION COMPONENT ACRE-FEET	PRESCRIPTIVE PUMPING COMPONENT ACRE-FEET	PUMPING COMPONENT SHARE %
JUH#1[3]			
(Successor to Monrovia Nursery Company)[2]	48.00	0.00	0.00000
(Transferred to Miles R. Rosedale)[2]	-16.00		
	32.00	**0.00**	**0.00000**
Los Angeles, County of	**310.00**	**3,721.30**	**1.88292**
Maechtlen, Estate of J. J., Trustee for the Estate of P.A. Maechtlen	0.00	301.50	0.15256
(Transferred to:			
City of Glendora		-150.00	-0.07590
Miller Brewing Company)[2]		-151.50	-0.07666
	0.00	**0.00**	**0.00000**
Maechtlen, Trust of J. J.[3]	1.49	0.00	0.00000
(Transferred to Otting, David; Otting, Larry; and Webster, Scott)[2]	-1.49	0.00	0.00000
(Successor to Otting, David; Otting, Larry; and Webster, Scott)[2]	1.49	0.00	0.00000
(Transferred to Nikowitz, et al)[2]	-1.49	0.00	0.00000
	0.00	**0.00**	**0.00000**
Maechtlen, Trust of P. A.[3]	0.50	100.50	0.05085
(Transferred to:			
City of Glendora		-50.00	-0.02530
Alice B. Phillips, et al.)[2]	-0.50	-50.50	-0.02555
	0.00	**0.00**	**0.00000**
The Metropolitan Water District of of Southern California	**9.59**	**165.00**	**0.08349**
Monrovia, City of	1,098.00	5,042.22	2.55129
(Successor to:			
Eckis, Rollin		123.00	0.06224
City of Arcadia)[2]		951.00	0.48119
	1,098.00	**6,116.22**	**3.09472**

INTEGRATED PRODUCER	DIVERSION COMPONENT ACRE-FEET	PRESCRIPTIVE PUMPING COMPONENT ACRE-FEET	PUMPING COMPONENT SHARE %
Monrovia Nursery Company	239.50	0.00	0.00000
(Successor to Azusa Foothill	718.50	0.00	0.00000
Citrus Company)[2]			
(Transferred:			
City of Azusa	-363.00	0.00	0.00000
Brierly, Susan K.	-24.00	0.00	0.00000
Rosedale, Miles R.	-191.00	0.00	0.00000
VanLandingham, Richard	-21.00	0.00	0.00000
JUH#1	-48.00	0.00	0.00000
Rosedale, Lance	-32.00	0.00	0.00000
CV Glendora 3 Site, LLC)[2]	-10.00	0.00	0.00000
	269.00	**0.00**	**0.00000**
Nikowitz, et al[3]			
(Successor to Maechtlen, Trust of J. J.)[2]	1.49	0.00	0.00000
(Held in common with Nikowitz, Sheryl M. and Walter P.; Pellegrino, Mark and Roxanne; Verdegem, Thomas and Sandra B.)			
(Transferred to DeFalco, John and Carole)[2]	-1.49	0.00	0.00000
	0.00	**0.00**	**0.00000**
Otting, David; Otting, Larry; and Webster, Scott[3]			
(Successor to Maechtlen, Trust of J. J.)[2]	1.49	0.00	0.00000
(Transferred to Maechtlen, Trust of J. J.)[2]	-1.49	0.00	0.00000
	0.00	**0.00**	**0.00000**
Phillips, Alice B., et al.[3]			
(Successor to Maechtlen, Trust of P. A.)[2]	0.50	50.50	0.02555
(Transferred to Miller Brewing Co.)[2]	____	-50.00	-0.02530
	0.50	**0.50**	**0.00025**
Rosedale, Lance[3]			
(Successor to Monrovia Nursery Company)[2]	**32.00**	**0.00**	**0.00000**
Rosedale, Miles R.[3]			
(Successor to Monrovia Nursery Company)[2]	191.00	0.00	0.00000
(Transferred to CV Glendora 3 Site, LLC)[2]	-184.00	0.00	0.00000
(Successor to:			
Susan K. Brierly	8.00	0.00	0.00000
JUH#1)[2]	16.00	0.00	0.00000
	31.00	**0.00**	**0.00000**

INTEGRATED PRODUCER	DIVERSION COMPONENT ACRE-FEET	PRESCRIPTIVE PUMPING COMPONENT ACRE-FEET	PUMPING COMPONENT SHARE %
San Gabriel Valley Water Company	0.00	16,659.00	8.42920
(Successor to:			
Vallecito Water Co.		2,867.00	1.45066
No. 17 Walnut Place Mutual Water Co.		21.50	0.01088
Cedar Avenue Mutual Water Company		121.10	0.06127
Beverly Acres Mutual Water Users Association		50.00	0.02530
Richwood Mutual Water Company		192.60	0.09745
Nicholson Trust, Helene S.		12.00	0.00607
Durfee Property, LLC		50.00	0.02530
Wright, Darrell A., Wright, Merle M. and Carlson, Jeanne W.		50.65	0.02563
Parton Family Trust		46.20	0.02338
Maddock, A.G.)[2]	3.40		
	3.40	**20,070.05**	**10.15514**
VanLandingham, Richard[3]			
(Successor to Monrovia Nursery Company)[2]	**21.00**	**0.00**	**0.00000**
TOTAL	**10,526.44**	**67,868.56**	**34.34047**

1/ Permanent transfer of rights as recorded at entry of Judgment.
2/ Permanent transfer of rights after entry of Judgment.
3/ Intervenor after Judgment.

EXHIBIT "F"

TABLE SHOWING
SPECIAL CATEGORY RIGHTS

PARTY	NATURE OF RIGHT
*The Metropolitan Water District of Southern California *Transferred to the San Gabriel Valley Protective Association 05/07/1996.	Morris Reservoir Storage and Withdrawal (a) A right to divert, store and use San Gabriel River Water, pursuant to Permit No. 7174. (b) Prior and paramount right to divert 72 acre-feet annually to offset Morris Reservoir evaporation and seepage losses and to provide the water supply necessary for presently existing incidental Morris Dam facilities.
Los Angeles County Flood Control District (now Los Angeles County Department of Public Works)	Puddingstone Reservoir Prior Prescriptive right to divert water from San Dimas Wash for storage in Puddingstone Reservoir in quantities sufficient to offset annual evaporation and seepage losses of the reservoir at approximate elevation 942.

EXHIBIT "G"

TABLE SHOWING NON-CONSUMPTIVE USERS

PARTY	NATURE OF RIGHT
Covina Irrigating Company Azusa Valley Water Company Azusa Agricultural Water Co. Azusa Foot-Hill Citrus Co. Monrovia Nursery	"Committee-of-Nine" Spreading Right To continue to divert water from the San Gabriel River pursuant to the 1888 Settlement, and to spread in spreading grounds within the Basin all water thus diverted without the right to recapture water in excess of said parties' rights as adjudicated in exhibit "E".
California-American Water Company (Duarte System)	Spreading Right To continue to divert water from the San Gabriel River pursuant to the 1888 Settlement, and to continue to divert water from Fish Canyon and to spread said waters in its spreading grounds in the Basin without the right to recapture water in excess of said party's rights as adjudicated in Exhibit "E".
City of Glendora	Spreading Right To continue to spread the water of Big and Little Dalton Washes, pursuant to License No. 2592 without the right to recapture water in excess of said party's rights as adjudicated in Exhibit "E".
San Gabriel Valley Protective Association	Spreading Right To continue to spread San Gabriel River water pursuant to License Nos. 9991 and 12,209, without the right to recapture said water.
Golden State Water Company (formerly *California Cities Water Company*)	Spreading Right To continue to spread waters from San Dimas Wash without the right to recapture water in excess of said party's rights as adjudicated in Exhibit "E".
Los Angeles County Flood Control District	Temporary storage of storm flow for regulatory purposes; Spreading and conservation for general benefit in streambeds, reservoirs and spreading grounds without the right to recapture said water. Maintenance and operation of dams and other flood control works.

EXHIBIT "H"

WATERMASTER OPERATING CRITERIA

1. **Basin Storage Capacity.** The highest water level at the end of a water year during the past 40 years was reached at the Key Well on September 30, 1944 (elevation 316). The State of California, Department of Water Resources, estimates that as of that date, the quantity of fresh water in storage in the Basin was approximately 8,600,000 acre-feet. It is also estimated by said Department that by September 30, 1960, the quantity of fresh water in storage had decreased to approximately 7,900,000 acre-feet (elevation 237 at the Key Well).

The lowest water level at the end of a water year during the past 40 years was reached at the Key Well on September 30, 1965 (elevation 209). It is estimated that the quantity of fresh water in storage in the Basin on that date was approximately 7,700,000 acre-feet.

Thus, the maximum utilization of Basin storage was approximately 900,000 acre-feet, occurring between September 30, 1944, and September 30, 1965 (between elevations 316 and 209 at the Key Well). This is not to say that more than 900,000 acre-feet of storage space below the September 30, 1944 water levels cannot be utilized. However, it demonstrates that pumpers have deepened their wells and lowered their pumps so that such 900,000 acre-feet of storage can be safely and economically utilized.

The storage capacity of the Basin between elevations of 200 and 250 at the Key Well represents a usable volume of approximately 400,000 acre-feet of water.

2. **Operating Safe Yield and Spreading.** Watermaster in determining Operating Safe Yield and the importation of Replacement Water shall be guided by water level elevations in the Basin. He shall give recognition to, and base his operations on, the following general objectives insofar as practicable and subject to Section 47 of the Judgment (Amended 6/21/12):

(a) The replenishment of ground water from sources of supplemental water should not cause excessively high levels of ground water and such replenishment should not cause undue waste of local water supplies.

(b) Certain areas within the Basin are not at the present time capable of being recharged with supplemental water. Efforts should be made to provide protection to such areas from excessive ground water lowering either through the "in lieu" provisions of the

Judgment or by other means.

(c) Watermaster shall consider and evaluate the long-term consequences on ground water quality, as well as quantity, in determining and establishing Operating Safe Yield. Recognition shall be given to the enhancement of ground water quality insofar as practicable, especially in the area immediately upstream of Whittier Narrows where degradation of water quality may occur when water levels at the Key Well are maintained at or below elevation 200.

(d) Watermaster shall take into consideration the comparative costs of supplemental and Make-up Water in determining the savings on a present value basis of temporary or permanent lowering or raising of water levels and other economic data and analyses indicating both the short-term and long-term propriety of adjusting Operating Safe Yield in order to derive optimum water levels during any period. Watermaster shall utilize the provisions in the Long Beach Judgment which will result in the least cost of delivering Make-up Water.

3. **Replacement Water -- Sources and Recharge Criteria.** The following criteria shall control purchase of Replacement Water and Recharge of the Basin by Watermaster.

(a) **Responsible Agency From Which to Purchase.** Watermaster, in determining the Responsible Agency from which to purchase supplemental water for replacement purposes, shall be governed by the following:

(1) **Place of Use of Water** which is used primarily within the Basin or by cities within San Gabriel District in areas within or outside the Basin shall control in determining the Responsible Agency. For purposes of this subparagraph, water supplied through a municipal water system which lies chiefly within the Basin shall be deemed entirely used within the Basin; and

(2) **Place of production of water** shall control in determining the Responsible Agency as to water exported from the Basin, except as to use within San Gabriel District.

Any Responsible Agency may, at the request of Watermaster, waive its right to act as the source for such supplemental water, in which case Watermaster shall be free to purchase such water from the remaining Responsible Agencies which are the most beneficial and appropriate sources; provided, however, that a Responsible Agency shall not authorize any sale of water in violation of the California Constitution.

(b) **Water Quality.** Watermaster shall purchase the best quality of supplemental water available for replenishment of the Basin, pursuant to subsection (a) hereof.

(c) **Reclaimed Water.** It is recognized that the technology and economic and physical necessity for utilization of reclaimed water is increasing. The purchase of reclaimed water in accordance with the Long Beach Judgment to satisfy the Make-up Obligation is expressly authorized. At the same time, water quality problems involved in the reuse of water within the Basin pose serious questions of increased costs and other problems to the pumpers, their customers and all water users. Accordingly, Watermaster is authorized to gather information, make and review studies, and make recommendations on the feasibility of the use of reclaimed water for replacement purposes; provided that no reclaimed water shall be recharged in the Basin by Watermaster without the prior approval of the court, after notice to all parties and hearing thereon.

(d) **Purchased Water Plan.** On or before November 1 of each year, Watermaster shall prepare and distribute to the Responsible Agencies a three-year projection of its Supplemental Water purchases from each agency. Watermaster shall, to the extent feasible, coordinate the tentative schedule for delivery and payment of those purchases with each agency. (Amended 6/21/12)

4. **Replacement Assessment Rates.** The Replacement Assessment rates may be in an amount calculated to allow Watermaster to purchase more than one acre-foot of Supplemental Water for each acre-foot of excess Production to which such Assessment applies, when such purchases are prudent in order to secure necessary Supplemental Water supplies for the benefit of the Basin and parties. In accordance with Rules and Regulations adopted by Watermaster, to the extent Watermaster purchases more than one acre-foot of Supplemental Water for each acre-foot of excess Production to which such Assessment applies, a credit shall be issued to the affected Producers at the time such excess water is purchased. (Amended 6/21/12)

EXHIBIT "J"

PUENTE NARROWS AGREEMENT

THIS AGREEMENT is made and entered into as of the 8th day of May, 1972, by and between PUENTE BASIN WATER AGENCY, herein called "Puente Agency", and UPPER SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT, herein called "Upper District".

A. RECITALS

1. Puente Agency. Puente Agency is a joint powers agency composed of Walnut Valley Water District, herein called "Walnut District", and Rowland Area County Water District, herein called "Rowland District". Puente Agency is formed for the purpose of developing and implementing a ground water basin management program for Puente Basin. Pursuant to said purpose, said Agency is acting as a representative of its member districts and of the water users and water right claimants therein in the defense and maintenance of their water rights within Puente Basin.

2. Upper District. Upper District is a municipal water district overlying a major portion of the Main San Gabriel Basin. Upper District is plaintiff in the San Gabriel Basin Case, wherein it seeks to adjudicate rights and implement a basin management plan for the Main San Gabriel Basin.

3. Puente Basin is a ground water basin tributary to the Main San Gabriel Basin. Said area was included within the scope of the San Gabriel Basin Case and substantially

all water rights claimants within Puente Basin were joined as defendants therein. The surface contribution to the Main San Gabriel Basin from Puente Basin is by way of the paved flood control channel of San Jose Creek, which passes through Puente Basin from the Pomona Valley area. Subsurface outflow is relatively limited and moves from the Puente Basin to the Main San Gabriel Basin through Puente Narrows.

4. Intent of Agreement. Puente Agency is prepared to assure Upper District that no activity within Puente Basin will hereafter be undertaken which will (1) interfere with surface flows in San Jose Creek, or (2) impair the subsurface flow from Puente Basin to the Main San Gabriel Basin. Walnut District and Rowland District, by operation of law and by express assumption endorsed hereon, assume the covenants of this agreement as a joint and several obligation. Based upon such assurances and the covenants hereinafter contained in support thereof, Upper District consents to the dismissal of all Puente Basin parties from the San Gabriel Basin Case. By reason of said dismissals, Puente Agency will be free to formulate a separate water management program for Puente Basin.

B. DEFINITIONS AND EXHIBITS

5. Definitions. As used in this Agreement, the following terms shall have the meanings herein set forth:

(a) Annual or Year refers to the fiscal year July 1 through June 30.

(b) Base Underflow. The underflow through

Exhibit "J"

Puente Narrows which Puente Agency agrees to maintain, and on which accrued debits and credits shall be calculated.

(c) Make-up Payment. Make-up payments shall be an amount of money payable to the Watermaster appointed in the San Gabriel Basin Case, sufficient to allow said Watermaster to purchase replacement water on account of any accumulated deficit as provided in Paragraph 9 hereof.

(d) Puente Narrows. The subsurface geologic constriction at the downstream boundary of Puente Basin, located as shown on Appendix "B".

(e) Main San Gabriel Basin, the ground water basin shown and defined as such in Exhibit "A" to the Judgment in the San Gabriel Basin Case.

(f) San Gabriel Basin Case. *Upper San Gabriel Valley Municipal Water District v. City of Alhambra, et al.*, L. A. Sup. Ct. No. 924128, filed January 2, 1968.

6. Appendices. Attached hereto and by this reference made a part hereof are the following appendices:

"A" -- Location Map of Puente Basin, showing major geographic, geologic, and hydrologic features.

"B" -- Map of Cross-Section Through Puente Narrows, showing major physical features and location of key wells.

Exhibit "J"

"C" -- Engineering Criteria, being a description of a method of measurement of subsurface outflow to be utilized for Watermaster purposes.

C. COVENANTS

7. Watermaster. There is hereby created a two member Watermaster service to which each of the parties to this agreement shall select one consulting engineer. The respective representatives on said Watermaster shall serve at the pleasure of the governing body of each appointing party and each party shall bear its own Watermaster expense.

a. Organization. Watermaster shall perform the duties specified herein on an informal basis, by unanimous agreement. In the event the two representatives are unable to agree upon any finding or decision, they shall select a third member to act, pursuant to the applicable laws of the State of California. Thereafter, until said issue is resolved, said three shall sit formally as a board of arbitration. Upon resolution of the issue in dispute, the third member shall cease to function further.

b. Availability of Information. Each party hereto shall, for itself and its residents and water users, use its best efforts to furnish all appropriate information to the Watermaster in order that the required determination can be made.

Exhibit "J"

c. Cooperation With Other Watermasters. Watermaster hereunder shall cooperate and coordinate activities with the Watermasters appointed in the San Gabriel Basin Case and in Long Beach v. San Gabriel Valley Water Company, et al.

d. Determination of Underflow. Watermaster shall annually determine the amount of underflow from Puente Basin to the San Gabriel Basin, pursuant to Engineering Criteria.

e. Perpetual Accounting. Watermaster shall maintain a perpetual account of accumulated base underflow, accumulated subsurface flow, any deficiencies by reason of interference with surface flows, and the offsetting credit for any make-up payments. Said account shall annually show the accumulated credit or debit in the obligation of Puente Agency to Upper District.

f. Report. Watermaster findings shall be incorporated in a brief written report to be filed with the parties and with the Watermaster in the San Gabriel Basin Case. Said report shall contain a statement of the perpetual account heretofore specified.

8. Base Underflow. On the basis of a study and review of historic underflow from Puente Basin to the Main San Gabriel Basin, adjusted for the effect of the paved flood control channel and other relevant considerations, it is

mutually agreed by the parties that the base underflow is and shall be 580 acre feet per year, calculated pursuant to Engineering Criteria.

9. Puente Agency's Obligation. Puente Agency covenants, agrees and assumes the following obligation hereunder:

a. Noninterference with Surface Flow. Neither Puente Agency nor any persons or entities within the corporate boundaries of Walnut District or Rowland District will divert or otherwise interfere with or utilize natural surface runoff now or hereafter flowing in the storm channel of San Jose Creek; provided, however, that this covenant shall not prevent the use, under Watermaster supervision, of said storm channel by the Puente Agency or Walnut District or Rowland District for transmission within Puente Agency of supplemental or reclaimed water owned by said entities and introduced into said channel solely for transmission purposes. In the event any unauthorized use of surface flow in said channel is made contrary to the covenant herein provided, Puente Agency shall compensate Upper District by utilizing any accumulated credit or by make-up payment in the same manner as is provided for deficiencies in subsurface outflow from Puente Basin.

b. Subsurface Outflow. To the extent that the accumulated subsurface outflow falls below the accumulated base underflow and the result thereof is an accumulated deficit in the Watermaster's annual accounting, Puente Agency agrees to provide make-up payments during the next year in an amount not less than one-third of the accumulated deficit.

c. Purchase of Reclaimed Water. To the extent that Puente Agency or Walnut District or Rowland District may hereafter purchase reclaimed water from the facilities of Sanitation District 21 of Los Angeles County, such purchaser shall use its best efforts to obtain waters originating within San Gabriel River Watershed.

10. Puente Basin Parties Dismissal. In consideration of the assumption of the obligation hereinabove provided by Puente Agency, Upper District consents to entry of dismissals as to all Puente Basin parties in San Gabriel Basin Case. This agreement shall be submitted for specific approval by the Court and a finding that it shall operate as full satisfaction of any and all claims by the parties within Main San Gabriel Basin against Puente Basin parties by reason of historic surface and subsurface flow.

Exhibit "J"

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed as of the day and date first above written.

Approved as to form:
CLAYSON, STARK, ROTHROCK & MANN

By ______________________
Attorneys for Puente Agency

PUENTE BASIN AGENCY

By ______________________
EDMOND M. BIEDERMAN
President

Approved as to form:

By ______________________
Attorney for Upper District

UPPER SAN GABRIEL VALLEY
MUNICIPAL WATER DISTRICT

By ______________________
Howard H. Hawkins
President

The foregoing agreement is approved and accepted, and the same is acknowledged as the joint and several obligation of the undersigned.

Approved as to form:

____
Attorney for Walnut District

WALNUT VALLEY WATER DISTRICT

By ______________________
J. P. BOURDET
Vice President

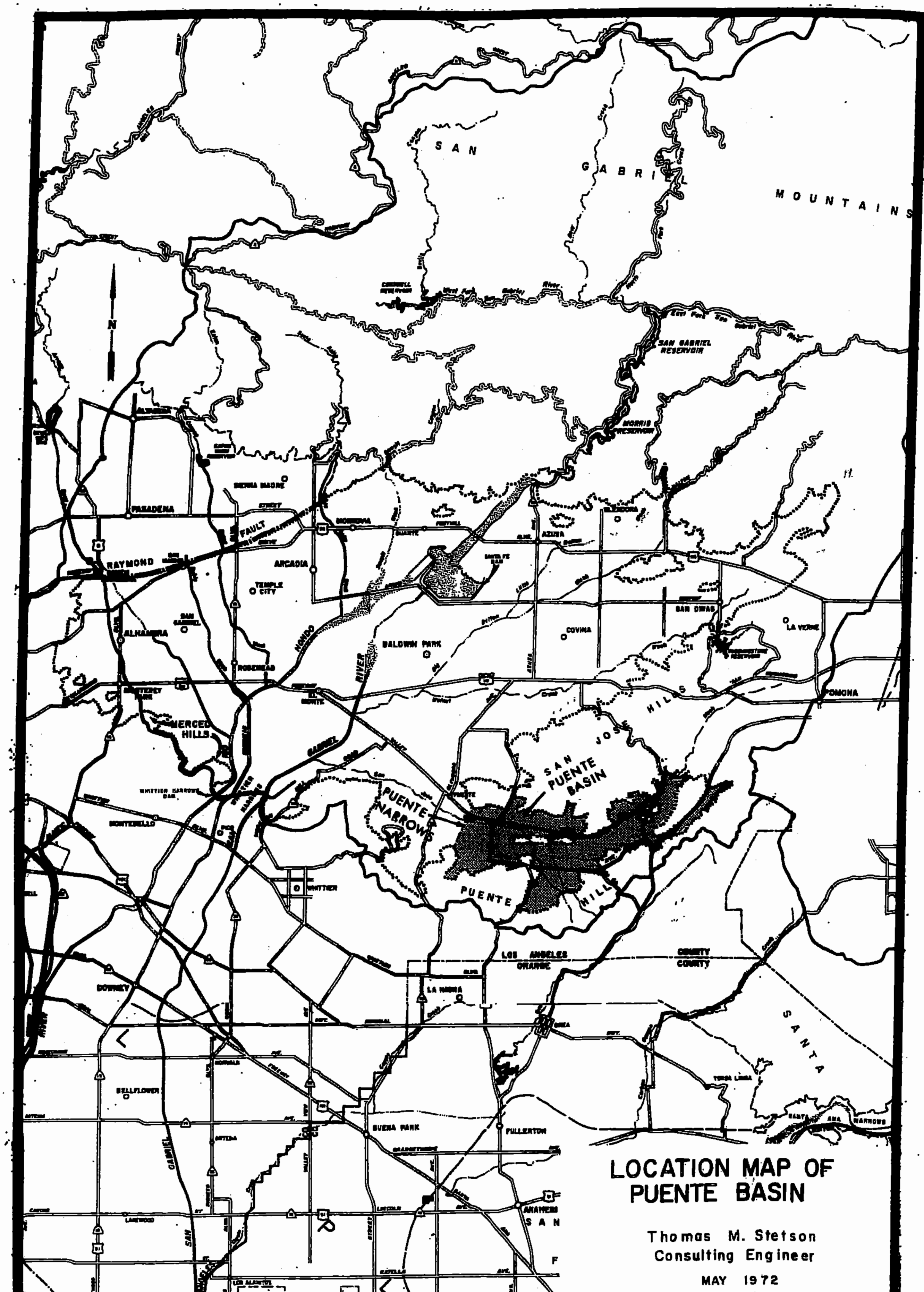
Approved as to form:

____
Attorneys for Rowland District

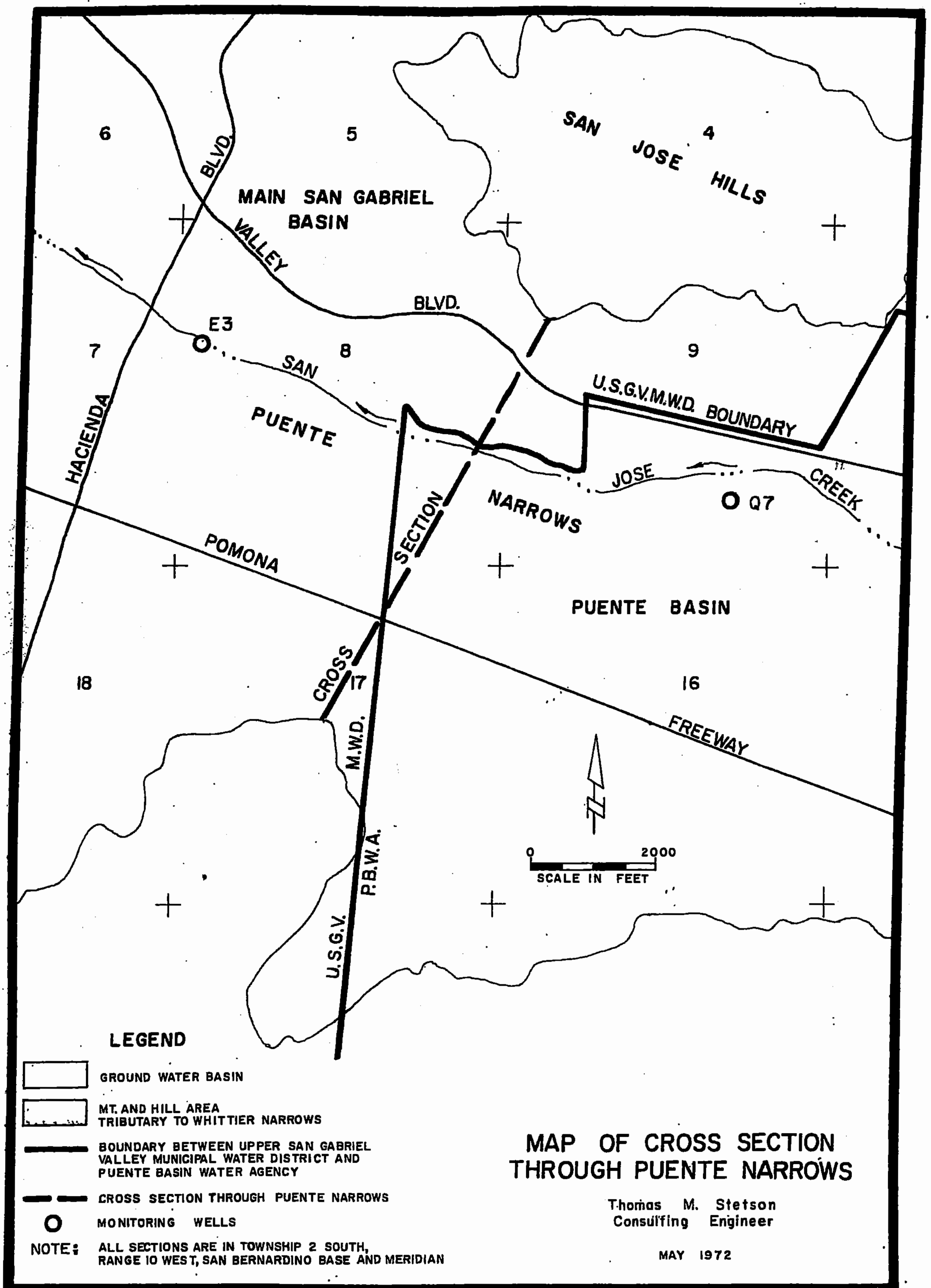
ROWLAND AREA COUNTY WATER
DISTRICT

By ______________________
President
Wm. A. Simmons

Exhibit "J"



APPENDIX "A"
EXHIBIT "J"



APPENDIX "B"
EXHIBIT "J"

ENGINEERING CRITERIA

APPENDIX "C"

1. Monitoring Wells. The wells designated as State Wells No. 2S/10W-9Q7 and 2S/10W-8E3 and Los Angeles County Flood Control District Nos. 3079M and 3048B, respectively, shall be used to measure applicable ground water elevations. In the event either monitoring well should fail or become unrepresentative, a substitute well shall be selected or drilled by Watermaster. The cost of drilling a replacement well shall be the obligation of the Puente Agency.

2. Measurement. Each monitoring well shall be measured and the ground water elevation determined semi-annually on or about April 1 and October 1 of each year. Prior to each measurement, the pump shall be turned off for a sufficient period to insure that the water table has recovered to a static or near equilibrium condition.

3. Hydraulic Gradient. The hydraulic gradient, or slope of the water surface through Puente Narrows, shall be calculated between the monitoring wells as the difference in water surface elevation divided by the distance, approximately 9,000 feet, between the wells. The hydraulic gradient shall be determined for the spring and fall and the average hydraulic gradient calculated for the year.

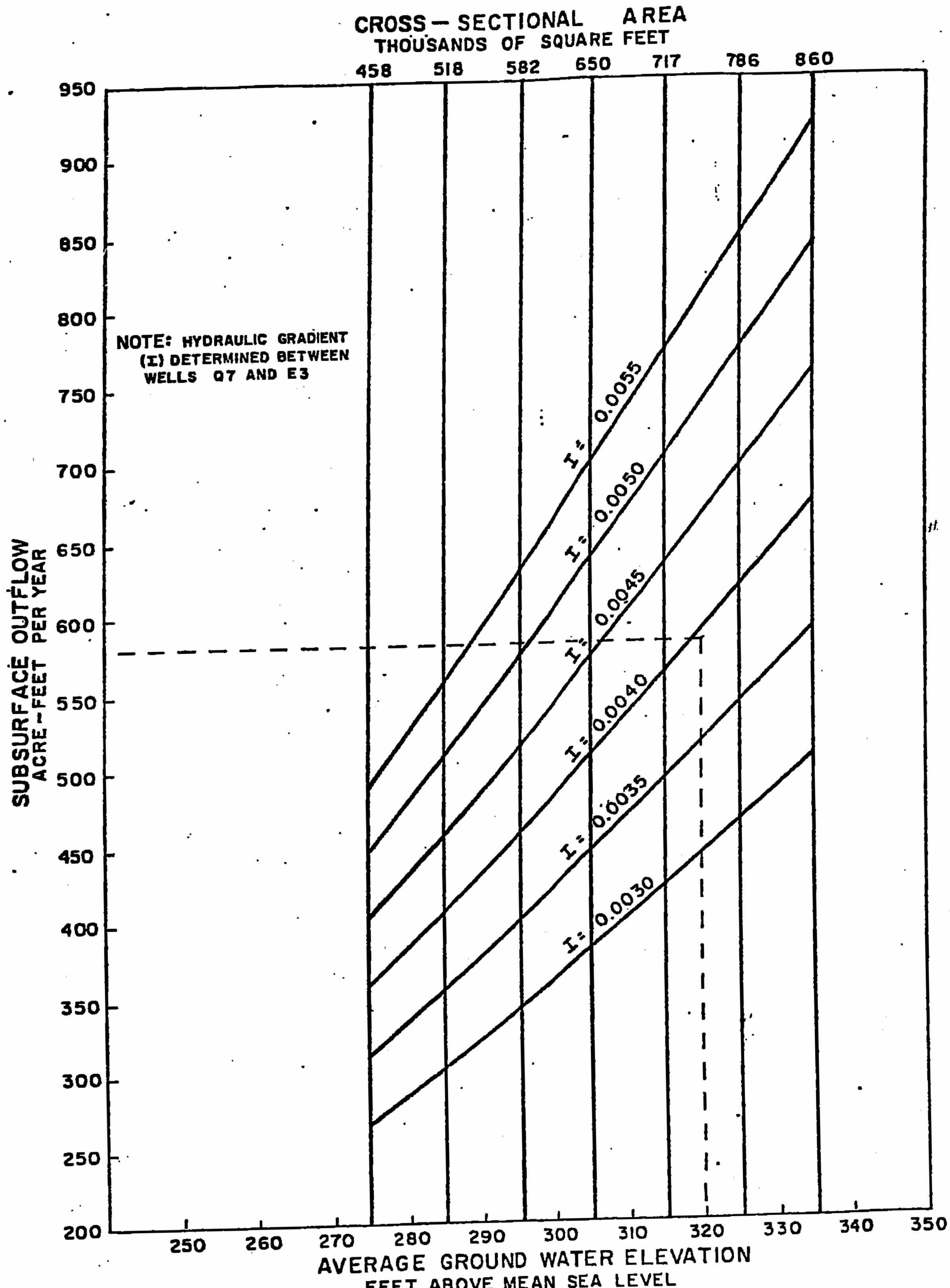
4. Ground Water Elevation at Puente Narrows Cross Section. The ground water elevation at the Puente Narrows

cross section midway between the monitoring wells shall be the average of the ground water elevation at the two wells. This shall be determined for the spring and fall and the average annual ground water elevation calculated for the year.

5. Determination of Underflow. The chart attached is a photo-reduction of a full scale chart on file with the Watermaster. By applying the appropriate average annual hydraulic gradient (I) to the average annual ground water elevation at the Puente Narrows cross section (involving the appropriate cross-sectional area [A]), it is possible to read on the vertical scale the annual acre feet of underflow.

APPENDIX "C"

Exhibit "J"



RELATIONSHIP OF AVERAGE GROUND WATER ELEVATION AT PUENTE NARROWS AND APPLICABLE CROSS-SECTIONAL AREA WITH SUBSURFACE OUTFLOW THROUGH PUENTE NARROWS FOR VARIOUS HYDRAULIC GRADIENTS

Thomas M. Stetson
Consulting Engineer
MAY 1972

EXHIBIT "J"

EXHIBIT "K"

OVERLYING RIGHTS

I. NATURE OF OVERLYING RIGHT

An "Overlying Right" is the right to Produce water from the Main San Gabriel Basin for use on the overlying lands hereinafter described. Such rights are exercisable without quantitative limit only on said overlying land and cannot be separately conveyed or transferred apart therefrom. The exerciser of such right is assessable by Watermaster as provided in Paragraph 21 of the Amended Judgment herein (prior Paragraph 14.5 of the Judgment herein) and is subject to the other provisions of said Paragraph.

II. OVERLYING LANDS (Description)

The overlying lands to which Overlying Rights are appurtenant are described as follows:

> "Those portions of Lots 1 and 2 of the lands formerly owned by W.A. Church, in the Rancho San Francisquito, in the City of Irwindale, County of Los Angeles, State of California, as shown on recorder's filed map No. 509, in the office of the County Recorder of said County, lying northeasterly of the northeasterly line and its southeasterly prolongation of Tract 1888, as shown on map recorded in Book 21 page 183 of Maps, in the office of the County Recorder of said County.
>
> "EXCEPT the portions thereof lying northerly and northwesterly of the center line of Arrow Highway described 'Sixth' and the center line of Live Oak Avenue described 'Third' in a final decree of condemnation, a certified copy of which was recorded August 18, 1933 as Instrument No. 354, in Book 12289, Page 277, Official Records.
>
> "ALSO EXCEPT that portion of said land described in the final decree of condemnation entered in Los Angeles County Superior Court Case No. 805008, a certified copy of which was recorded September 21, 1964, as Instrument No. 3730 in Book D-2634, Page 648, Official Records."

III. PRODUCERS ENTITLED TO EXERCISE OVERLYING RIGHTS AND THEIR RESPECTIVE CONSUMPTIVE USE PORTIONS

The persons entitled to exercise Overlying Rights are both the owners of Overlying Rights and persons and entities licensed by such owners to exercise such Overlying Rights. The persons entitled to exercise Overlying Rights and their respective Consumptive Use portions are as follows:

OWNER PRODUCERS	CONSUMPTIVE USE PORTION
BROOKS GIFFORD, SR. BROOKS GIFFORD, JR. PAUL MNOIAN JOHN MGRDICHIAN J. EARL GARRETT	3.5 acre-feet per year
Present User: Nu-Way Industries	

PRODUCERS UNDER LICENSE

A.	WILLIAM C. THOMAS and EVELYN F. THOMAS, husband and wife, and MALCOLM K. GATHERER and JACQUELINE GATHERER, husband and wife, doing business by and through B & B REDI-I-MIX CONCRETE, INC., a corporation	45.6 acre-feet per year
B.	PRE-STRESS CRANE RIGGING & TRUCK CO., INC., a corporation	1.0 acre-foot per year
	Present Users: Pre-Stress Crane Rigging & Truck Co., Inc., a corporation	
	TOTAL	50.1 acre-feet per year

IV. ANNUAL GROSS AMOUNT OF PRODUCTION FROM WHICH CONSUMPTIVE USE PORTIONS WERE DERIVED 183.65 acre-feet

EXHIBIT "K"

CONSUMPTIVE USE PORTIONS OF PRODUCERS WITH OVERLYING RIGHTS AS OF JUNE 30, 2013

OVERLYING PRODUCER	CONSUMPTIVE USE PORTION (ACRE-FEET)
1. Mnoian-Gifford Interests	
Owner Producers	
Paul Mnoian[3]	
Brooks Gifford, Sr.[3]	
Brooks Gifford, Jr.[3]	
John Mgrdichian[3]	
J. Earl Garrett[3]	
Present User: Nu-Way Industries	**3.5**
Producers Under License	
William C. Thomas[3]	
Evelyn F. Thomas[3]	
Malcolm K. Gatherer[3]	
Jacqueline Gatherer[3]	
Present User: B & B Red-I-Mix Concrete, Inc.	45.6
Pre-Stress Crane Rigging and Truck, Co., Inc.[3]	1.0
	50.1
2. Attalla, Phillip Y. and Mary L.[3]	**29.9**
3. Citrus Valley Medical Center, Queen of the Valley Campus.[3] (Formerly Queen of the Valley Hospital.[3])	**4.5**
4. S.L.S & N. Inc.[3]	--
TOTAL	**84.5**

1/ Permanent transfer of rights as recorded within Exhibits "C", "D", and "E" of Judgment.

2/ Permanent transfer of rights after entry of Judgment.

3/ Intervenor after Judgment.

EXHIBIT "L"

LIST OF PRODUCERS AND THEIR DESIGNEES
June 21, 2012

PRODUCER	DESIGNEE
Adams Ranch Mutual Water Company	Domenic T. Cimarusti
Alhambra, City of	Mary Chavez
Amarillo Mutual Water Company	John Holzinger
Anderson Family Marital Trust	Carolyn Heinrich
Andrade, Susan	Susan Andrade
Aqua Capital Management LP	David L. Penrice
Arcadia, City of	Tom Tait
Azusa, City of	Chet Anderson
Azusa Agricultural Water Company	Chet Anderson
Azusa Valley Water Company	Chet Anderson
Bandel Family Trust	Candace Garnier Bandel
Banks, Gale C. and Vicki L.	Gale and Vicki Banks
Brezina Trust 2001, Raymond W. and Susan W.	Raymond W. Brezina
Brierly, Susan K.	Reiner Kruger
Brondino, Jeanne	Jeanne Brondino
Cadway, Inc.	James M. Byerrum
California-American Water Company (Duarte System)	Todd Brown
California-American Water Company (San Marino System)	Todd Brown
California Domestic Water Company	James M. Byerrum
Canyon Water Company	William McIntyre
Canyon Water & Development Corporation	Chet Anderson
Champion Mutual Water Company	Bryan P. Hellein
Chevron U.S.A.	Leon F. Drozd, Esq.
Citrus Valley Medical Center, Queen of the Valley Campus	Gregory J. Landers
Coiner, James W., dba Coiner Nursery	James W. Coiner
County Sanitation District No. 18	Raymond Tremblay
Covina, City of	Daryl Parrish
Covina Irrigating Company	David D. De Jesus
Crevolin, A. J.	A. J. Crevolin
CV Glendora 3 Site, LLC	Bill McReynolds
Dawes, Mary Kay	Mary Kay Partridge
DeFalco, John and Carole	John and Carole DeFalco
Del Rio Mutual Water Company	Dario Herrera
Driftwood Dairy	David Trenkenschuh

PRODUCER	DESIGNEE
East Pasadena Water Company	Lawrence M. Morales
El Monte, City of	Rene Bobadilla
El Monte Cemetery Association	Todd Brown
Fox Family Trust Michael Edward Fox and Crystal Marie Fox, Trustees	Michael and Crystal Fox
Garnier Family Trust, Anton C. and Anita	Anton C. and Anita Garnier
Garnier, Ruth Elaine Ailor Trust	Renee Garnier Poivre
Gates, James Richard	James Richard Gates
Glendora, City of	Steve Patton
Golden State Water Company - San Dimas District	Patrick Scanlon
Golden State Water Company - San Gabriel Valley District	Benjamin Lewis, Jr.
Green, Walter	Dr. Walter Green
Hanson Aggregates West, Inc.	Michael Rogers
Heinrich, Carolyn	Carolyn Heinrich
Hemlock Mutual Water Company	Robert McClung
Industry Waterworks Systems, City of	Gregory B. Galindo
Irwindale, City of	Sol Benudiz
JUH #1	Reiner Kruger
Kirklen, Jeffery B.	Jeffery B. Kirklen
Knight, William J.	William J. Knight
Landeros, John	John Landeros
La Puente Valley County Water District	Gregory B. Galindo
Lovelady, June G., Trustee	June G. Lovelady
Los Angeles, County of	Robert Maycumber
Loucks, David	David Loucks
Maddock, A.G.	S. Joellen Maddock
Maggiore, Valarie	Valarie Maggiore
McIntyre, William	William McIntyre
Metropolitan Water District of Southern California	Lorraine Aoys
Miller Coors LLC	Jeffrey D. Arbour
Monrovia, City of	Ron Bow
Monrovia Nursery	Reiner Kruger
Monterey Park, City of	Elias Saykali
Munoz, Ralph	Ralph Munoz
Nicholson Trust, The	M. L. Whitehead
Nicholson Family Trust, The	M. L. Whitehead

PRODUCER	DESIGNEE
Parton Family Trust	Vernal O. and Marverna Parton
Pellissier Irrevocable QTIP Trust, et al, Laurence R., Co-tenancy of	James M. Byerrum
Pico County Water District	Mark Grajeda
Polopolus, et. Al	Helen Gaskins
Rados Brothers	Alexander S. Rados
Rosedale, Lance	Reiner Kruger
Rosedale, Miles R.	Reiner Kruger
Rosemead Development LTD.	John W. Lloyd
Rurban Homes Mutual Water Company	George W. Bucey
Ruth, Roy	Roy Ruth
San Gabriel Country Club	Eddie Villanueva
San Gabriel County Water District	Barbara A. Carrera
San Gabriel Valley Municipal Water District	Darin Kasamoto
San Gabriel Valley Water Company	Michael L. Whitehead
Sierra La Verne Country Club	Donald Johnson
Sierra Madre, City of	Bruce Inman
Sonoco Products Company	Khaleda Hamid
South Pasadena, City of	Marcelino Aguilar
Southern California Edison Company	Jorge A. Rosa, Jr.
Southwest Water Company	Richard J. Rich
Sterling Mutual Water Company	Joy Ann Burt
Suburban Water Systems	Michael Quinn
Sunny Slope Water Company	Ken Tcheng
Tate, Phillip G. and Sieglinde A.	Phillip Tate
Three Valleys Municipal Water District	Richard W. Hansen
Tomovich, Nick and Sons	Nick Tomovich
Hieu Tran	Hieu Tran
Tyler Nursery	Fumiko Kishi
USA Waste of California, Inc.	Joseph J. Cassin
United Rock Products Corporation	Russ Caruso
Upper San Gabriel Valley Municipal Water District	Steven P. O'Neill
Valencia Heights Water Company	P. David Michalko
Valley County Water District	Lynda A. Noriega
Valley View Mutual Water Company	Sukie Madrid
VanLandingham, Richard	Reiner Kruger
Vietnamese American Buddhist Temple Congregation	Thích Viên Ly
Vulcan Materials Company	Robert W. Bowcock

PRODUCER	DESIGNEE
Whittier, City of	Daniel Wall
Wilmott, Erma M.	Erma M. Wilmott
Woodland, Richard	Richard J. Woodland
Workman Mill Investment Company	Bruce A. Lazenby

EXHIBIT "M"

WATERMASTER MEMBERS

FOR CALENDAR YEAR 1973

ROBERT T. BALCH (Producer Member), Chairman

LINN E. MAGOFFIN (Producer Member), Vice Chairman

RICHARD L. ROWLAND (Producer Member), Secretary

BOYD KERN (Public Member), Treasurer

WALKER HANNON (Producer Member)

HOWARD H. HAWKINS (Public Member)

M.E. MOSLEY (Producer Member)

CONRAD T. REIBOLD (Public Member)

HARRY C. WILLS (Producer Member)

STAFF

Carl Fossette, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1974

ROBERT T. BALCH (Producer Member), Chairman

LINN E. MAGOFFIN (Producer Member), Vice Chairman

RICHARD L. ROWLAND (Producer Member), Secretary

BOYD KERN (Public Member), Treasurer

WALKER HANNON (Producer Member)

BURTON E. JONES (Public Member)

M.E. MOSLEY (Producer Member)

CONRAD T. REIBOLD (Public Member)

HARRY C. WILLS (Producer Member)

STAFF

Carl Fossette, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1975

ROBERT T. BALCH (Producer Member), Chairman

LINN E. MAGOFFIN (Producer Member), Vice Chairman

HARRY C. WILLS (Producer Member), Secretary

BOYD KERN (Public Member), Treasurer

WALKER HANNON (Producer Member)

BURTON E. JONES (Public Member)

D.J. LAUGHLIN (Producer Member)

M.E. MOSLEY (Producer Member)

CONRAD T. REIBOLD (Public Member)

STAFF

Carl Fossette, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1976

ROBERT T. BALCH (Producer Member), Chairman

LINN E. MAGOFFIN (Producer Member), Vice Chairman

HARRY C. WILLS (Producer Member), Secretary

BOYD KERN (Public Member), Treasurer

WALKER HANNON (Producer Member)

BURTON E. JONES (Public Member)

D.J. LAUGHLIN (Producer Member)

M.E. MOSLEY (Producer Member)

CONRAD T. REIBOLD (Public Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1977

ROBERT T. BALCH (Producer Member), Chairman

LINN E. MAGOFFIN (Producer Member), Vice Chairman

HARRY C. WILLS (Producer Member), Secretary

CONRAD T. REIBOLD (Public Member), Treasurer

WALKER HANNON (Producer Member)

BURTON E. JONES (Public Member)

BOYD KERN (Public Member)

D.J. LAUGHLIN (Producer Member)

R.H. NICHOLSON, JR. (Producer Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1978

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LINN E. MAGOFFIN (Producer Member), Vice Chairman

D.J. LAUGHLIN (Producer Member), Secretary

CONRAD T. REIBOLD (Public Member), Treasurer

WALKER HANNON (Producer Member)

BURTON E. JONES (Public Member)

L.E. MOELLER (Producer Member)

R.H. NICHOLSON, JR. (Producer Member)

WILLIAM M. WHITESIDE (Public Member)

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Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1979

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ROBERT G. BERLIEN (Producer Member)*

ANTON C. GARNIER (Producer Member)

D.J. LAUGHLIN (Producer Member)**

TRAVIS L. MANNING (Public Member)

L.E. MOELLER (Producer Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

* Elected March 1979 to replace D.J. Laughlin, following his resignation.

** Resigned from Watermaster in February 1979.

FOR CALENDAR YEAR 1980

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CONRAD T. REIBOLD (Public Member), Treasurer

ROBERT T. BALCH (Producer Member)

ROBERT G. BERLIEN (Producer Member)

ANTON C. GARNIER (Producer Member)

TRAVIS L. MANNING (Public Member)

L.E. MOELLER (Producer Member)

STAFF

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CONRAD T. REIBOLD (Public Member), Treasurer

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ROBERT G. BERLIEN (Producer Member)

ANTON C. GARNIER (Producer Member)

TRAVIS L. MANNING (Public Member)

L.E. MOELLER (Producer Member)

STAFF

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FOR CALENDAR YEAR 1982

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CONRAD T. REIBOLD (Public Member), Treasurer

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ROBERT G. BERLIEN (Producer Member)

ANTON C. GARNIER (Producer Member)

L.E. MOELLER (Producer Member)

ALFRED F. WITTIG (Public Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1983

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CONRAD T. REIBOLD (Public Member), Treasurer

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DONALD F. CLARK (Public Member)

ANTON C. GARNIER (Producer Member)

L.E. MOELLER (Producer Member)

ALFRED F. WITTIG (Public Member)

STAFF

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Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1984

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R.H. NICHOLSON, JR. (Producer Member), Vice Chairman

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CONRAD T. REIBOLD (Public Member), Treasurer

ROBERT T. BALCH (Producer Member)

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ANTON C. GARNIER (Producer Member)

L.E. MOELLER (Producer Member)

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STAFF

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Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1985

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ANTON C. GARNIER (Producer Member)

L.E. MOELLER (Producer Member)

ALFRED F. WITTIG (Public Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

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CONRAD T. REIBOLD (Public Member), Treasurer

ROBERT T. BALCH (Producer Member)

DONALD F. CLARK (Public Member)

L.E. MOELLER (Producer Member)

REGINALD A. STONE (Producer Member)

ALFRED F. WITTIG (Public Member)

STAFF

Jane M. Bray, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1987

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GERALD J. BLACK (Producer Member)

DONALD F. CLARK (Public Member)

EDWARD R. HECK (Producer Member)

JOHN E. MAULDING (Public Member)

STAFF

Robert G. Berlien, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1988

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ROBERT T. BALCH (Producer Member)

GERALD J. BLACK (Producer Member)

DONALD F. CLARK (Public Member)

EDWARD R. HECK (Producer Member)

JOHN E. MAULDING (Public Member)

STAFF

Robert G. Berlien, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1989

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GERALD J. BLACK (Producer Member), Secretary

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ROBERT T. BALCH (Producer Member)*

DONALD F. CLARK (Public Member)

EDWARD R. HECK (Producer Member)

BURTON E. JONES (Public Member)

NELS PALM (Producer Member)**

THOMAS E. SHOLLENBERGER (Producer Member)

STAFF

Robert G. Berlien, Assistant Secretary-Assistant Treasurer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

* DECEASED APRIL 25, 1989

** Appointed August 24, 1989, for the balance of the calendar year term, to replace deceased member, Robert T. Balch.

FOR CALENDAR YEAR 1990

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GERALD J. BLACK (Producer Member), Secretary

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DONALD F. CLARK (Public Member)

EDWARD R. HECK (Producer Member)

BURTON E. JONES (Public Member)

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THOMAS E. SHOLLENBERGER (Producer Member)

STAFF

Robert G. Berlien, Assistant Secretary-Assistant Treasurer
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Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1991

LINN E. MAGOFFIN (Producer Member), Chairman

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NELS PALM (Producer Member), Treasurer

ROYALL K. BROWN (Public Member)

MARVIN JOE CICHY (Public Member)

EDWARD R. HECK (Producer Member)

C. ROBER KEISER (Public Member)

ANDREW A. KRUEGER (Producer Member)

STAFF

John E. Maulding, Executive Officer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1992

LINN E. MAGOFFIN (Producer Member), Chairman

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NELS PALM (Producer Member), Treasurer

ROYALL K. BROWN (Public Member)

RICHARD W. CANTWELL (Producer Member)

BURTON E. JONES (Public Member)

C. ROBER KEISER (Public Member)

ANDREW A. KRUEGER (Producer Member)

STAFF

John E. Maulding, Executive Officer
Ralph B. Helm, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1993

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NELS PALM (Producer Member), Treasurer

RICHARD W. CANTWELL (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

ANDREW A. KRUEGER (Producer Member)

LEROY E. MOELLER (Public Member)

STAFF

John E. Maulding, Executive Officer
Frederic A. Fudacz, Attorney (Effective February 1993)
Ralph B. Helm, Attorney (Retired January 1993)
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1994

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RICHARD W. CANTWELL (Producer Member), Secretary***

STANLEY D. YARBROUGH (Producer Member), Treasurer

GERALD J. BLACK (Producer Member)*

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

MANNY J. MAGANA (Producer Member)

P. GEOFFREY NUNN (Producer Member)*******

LEROY E. MOELLER (Public Member)

MICHAEL L. WHITEHEAD (Producer Member)**

STAFF

John E. Maulding, Executive Officer****
Carol Williams, Executive Officer*****
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

*	Mr. Black resigned from Watermaster on February 4, 1994
**	Mr. Whitehead was nominated to Watermaster on March 2, 1994
***	Mr. Cantwell was elected as Watermaster Secretary on May 4, 1994
****	Mr. Maulding passed away on March 13, 1994
*****	Ms. Williams was appointed Executive Officer on August 3, 1994
******	Mr. Magoffin resigned from Watermaster on August 3, 1994
*******	Mr. Nunn was nominated to Watermaster on August 8, 1994

FOR CALENDAR YEAR 1995

REGINALD A. STONE (Producer Member), Chairman

RICHARD W. CANTWELL (Producer Member), Vice Chairman

MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

JUDITH L. ALMOND (Producer Member)

ROBERT W. BOWCOCK (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1996

REGINALD A. STONE (Producer Member), Chairman

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MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

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FRANK F. FORBES (Public Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1997

REGINALD A. STONE (Producer Member), Chairman

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MICHAEL L. WHITEHEAD (Producer Member), Treasurer

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ROBERT W. BOWCOCK (Producer Member)

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FRANK F. FORBES (Public Member)

LEROY E. MOELLER (Public Member)

STAFF

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Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1998

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RICHARD W. CANTWELL (Producer Member), Vice Chairman

MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

JUDITH L. ALMOND (Producer Member)

ROBERT W. BOWCOCK (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 1999

REGINALD A. STONE (Producer Member), Chairman

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MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

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FRANK F. FORBES (Public Member)

JAMES B. GALLAGHER (Producer Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2000

REGINALD A. STONE (Producer Member), Chairman

RICHARD W. CANTWELL (Producer Member), Vice Chairman

MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

ROBERT W. BOWCOCK (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

JAMES B. GALLAGHER (Producer Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2001

REGINALD A. STONE (Producer Member), Chairman

RICHARD W. CANTWELL (Producer Member), Vice Chairman

MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

ROBERT W. BOWCOCK (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

JAMES B. GALLAGHER (Producer Member)

LEROY E. MOELLER (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2002

REGINALD A. STONE (Producer Member), Chairman

RICHARD W. CANTWELL (Producer Member), Vice Chairman

MANNY J. MAGANA (Producer Member), Secretary

MICHAEL L. WHITEHEAD (Producer Member), Treasurer

ROBERT W. BOWCOCK (Producer Member)

MARVIN JOE CICHY (Public Member)

FRANK F. FORBES (Public Member)

JAMES B. GALLAGHER (Producer Member)

CAROL A. MONTANO (Public Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2003

REGINALD A. STONE (Producer Member), Chairman

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ROBERT W. NICHOLSON (Producer Member), Treasurer

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ALFONSO CONTRERAS (Public Member)

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THOMAS LOVE (Public Member)

CHARLES SHAW (Producer Member)

STAFF

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Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2004

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ROBERT W. BOWCOCK (Producer Member), Secretary

ROBERT W. NICHOLSON (Producer Member), Treasurer

RICHARD W. CANTWELL (Producer Member)

ALFONSO CONTRERAS (Public Member)

FRANK F. FORBES (Public Member)

THOMAS LOVE (Public Member)

CHARLES E. SHAW (Producer Member)

STAFF

Carol Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer

FOR CALENDAR YEAR 2005

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LEON M.N. GARCIA (Public Member)

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CHARLES E. SHAW (Producer Member)

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LEON M.N. GARCIA (Public Member)

THOMAS LOVE (Public Member)

CHARLES E. SHAW (Producer Member)

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ED CHAVEZ (Public Member)

ALFONSO CONTRERAS (Public Member)

THOMAS LOVE (Public Member)

MICHAEL O. QUINN (Producer Member)

STAFF

Carol Thomas Williams, Executive Officer
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Thomas M. Stetson, Engineer

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ED CHAVEZ (Public Member)

ALFONSO CONTRERAS (Public Member)

THOMAS LOVE (Public Member)

MICHAEL O. QUINN (Producer Member)

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Thomas M. Stetson, Engineer

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CHET ANDERSON (Producer Member)

ED CHAVEZ (Public Member)

THOMAS LOVE (Public Member)

MICHAEL O. QUINN (Producer Member)

CHARLES TREVINO (Public Member)

STAFF

Carol Thomas Williams, Executive Officer
Frederic A. Fudacz, Attorney
Thomas M. Stetson, Engineer*
Stephen B. Johnson, Engineer**

* Thomas M. Stetson passed away 4/14/2011
** Stephen B. Johnson replaced Mr. Stetson

FOR CALENDAR YEAR 2012

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CHET ANDERSON (Producer Member)

ED CHAVEZ (Public Member)

THOMAS LOVE (Public Member)

MICHAEL O. QUINN (Producer Member)

CHARLES TREVINO (Public Member)

STAFF

Carol Thomas Williams, Executive Officer *
Anthony C. Zampiello, Executive Officer**
Frederic A. Fudacz, Attorney
Stephen B. Johnson, Engineer

* Carol Thomas Williams resigned on 5/12/12
** Anthony C. Zampiello appointed to Executive Officer 9/26/12

FOR CALENDAR YEAR 2013

JAMES M. BYERRUM (Producer Member), Chairman

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DAN ARRIGHI (Producer Member), Secretary

RICHARD RICH (Producer Member), Treasurer

CHET ANDERSON (Producer Member)

ANTHONY R. FELLOW (Public Member)

GARRY HOFER (Producer Member)

THOMAS LOVE (Public Member)

CHARLES TREVINO (Public Member)

STAFF

Anthony C. Zampiello, Executive Officer
Frederic A. Fudacz, Attorney
Stephen B. Johnson, Engineer

APPENDIX B

Title 22 Code of Regulations

NOTE: This publication is meant to be an aid to the staff of the State Board's Division of Drinking Water and cannot be relied upon by the regulated community as the State of California's representation of the law. The published codes are the only official representation of the law. Refer to the published codes—in this case, Title 17 and 22 CCR—whenever specific citations are required.

State Water Resources Control Board

Regulations Related to Recycled Water
July 16, 2015

Sections amended, adopted, repealed, or not included in the previous version are highlighted in yellow. If the text in a section, subsection, or paragraph is highlighted, it is new. If only the section/paragraph number is highlighted, it was amended or repealed. Some nonsubstantive revisions may not be shown.

TITLE 17 CODE OF REGULATIONS

Division 1. State Department of Health Services

Chapter 5. Sanitation (Environmental)

Group 4. Drinking Water Supplies

Article 1. General.

§7583. Definitions.
In addition to the definitions in Section 4010.1 of the Health and Safety Code, the following terms are defined for the purpose of this Chapter:

(a) "Approved Water Supply" is a water supply whose potability is regulated by a State of local health agency.

(b) "Auxiliary Water Supply" is any water supply other than that received from a public water system.

(c) "Air-gap Separation (AG)" is a physical break between the supply line and a receiving vessel.

(d) "AWWA Standard" is an official standard developed and approved by the American Water Works Association (AWWA).

(e) "Cross-Connection" is an unprotected actual or potential connection between a potable water system used to supply water for drinking purposes and any source or system containing unapproved water or a substance that is not or cannot be approved as safe, wholesome, and potable. By-pass arrangements, jumper connections, removable sections, swivel or changeover devices, or other devices through which backflow could occur, shall be considered to be cross-connections.

(f) "Double Check Valve Assembly (DC)" is an assembly of at least two independently acting check valves including tightly closing shut-off valves on each side of the check valve assembly and test cocks available for testing the watertightness of each check valve.

(g) "Health Agency" means the California Department of Health Services, or the local health officer with respect to a small water system.

(h) "Local Health Agency" means the county or city health authority.

(i) "Reclaimed Water" is a wastewater which as a result of treatment is suitable for uses other than potable use.

(j) "Reduced Pressure Principle Backflow Prevention Device (RP)" is a backflow preventer incorporating not less than two check valves, an automatically operated differential relief valve located between the two check valves, a tightly closing shut-off valve on each side of the check valve assembly, and equipped with necessary test cocks for testing.

(k) "User Connection" is the point of connection of a user's piping to the water supplier's facilities.

(l) "Water Supplier" is the person who owns or operates the public water system.

(m) "Water User" is any person obtaining water from a public water supply.

§7584. Responsibility and scope of program.

The water supplier shall protect the public water supply from contamination by implementation of a cross-connection control program. The program, or any portion thereof, may be implemented directly by the water supplier or by means of a contract with the local health agency, or with another agency approved by the health agency. The water supplier's cross-connection control program shall for the purpose of addressing the requirements of Sections 7585 through 7605 include, but not be limited to, the following elements:

(a) The adoption of operating rules or ordinances to implement the cross-connection program.

(b) The conducting of surveys to identify water user premises where cross-connections are likely to occur,

(c) The provisions of backflow protection by the water user at the user's connection or within the user's premises or both,

(d) The provision of at least one person trained in cross-connection control to carry out the cross-connection program,

(e) The establishment of a procedure or system for testing backflow preventers, and

(f) The maintenance of records of locations, tests, and repairs of backflow preventers.

§7585. Evaluation of hazard.

The water supplier shall evaluate the degree of potential health hazard to the public water supply which may be created as a result of conditions existing on a user's premises. The water supplier, however, shall not be responsible for abatement of cross-connections which may exist within a user's premises. As a minimum, the evaluation should consider: the existence of cross-connections, the nature of materials handled on the property, the probability of a backflow occurring, the degree of piping system complexity and the potential for piping system modification. Special consideration shall be given to the premises of the following types of water users:

(a) Premises where substances harmful to health are handled under pressure in a manner which could permit their entry into the public water system. This includes chemical or biological process waters and water from public water supplies which have deteriorated in sanitary quality.

(b) Premises having an auxiliary water supply, unless the auxiliary supply is accepted as an additional source by the water supplier and is approved by the health agency.

(c) Premises that have internal cross-connections that are not abated to the satisfaction of the water supplier or the health agency.

(d) Premises where cross-connections are likely to occur and entry is restricted so that cross-connection inspections cannot be made with sufficient frequency or at sufficiently short notice to assure that cross-connections do not exist.

(e) Premises having a repeated history of cross-connections being established or re-established.

§7586. User supervisor.

The health agency and water supplier may, at their discretion, require an industrial water user to designate a user supervisor when the water user's premises has a multipiping system that convey various types of fluids, some of which may be hazardous and where changes in the piping system are frequently made. The user supervisor shall be responsible for the avoidance of cross-connections during the installation, operation and maintenance of the water user's pipelines and equipment.

Article 2. Protection of Water System.

§7601. Approval of backflow preventers.

Backflow preventers required by this Chapter shall have passed laboratory and field evaluation tests performed by a recognized testing organization which has demonstrated their competency to perform such tests to the Department.

§7602. Construction of backflow preventers.

(a) Air-gap Separation. An Air-gap separation (AG) shall be at least double the diameter of the supply pipe, measured vertically from the flood rim of the receiving vessel to the supply pipe; however, in no case shall this separation be less than one inch.

(b) Double Check Valve Assembly. A required double check valve assembly (DC) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Double Check Valve Type Backflow Preventive Devices which is herein incorporated by reference.

(c) Reduced Pressure Principle Backflow Prevention Device. A required reduced pressure principle backflow prevention device (RP) shall, as a minimum, conform to the AWWA Standard C506-78 (R83) adopted on January 28, 1978 for Reduced Pressure Principle Type Backflow Prevention Devices which is herein incorporated by reference.

§7603. Location of backflow preventers.

(a) Air-gap Separation. An air-gap separation shall be located as close as practical to the user's connection and all piping between the user's connection and the receiving tank shall be entirely visible unless otherwise approved in writing by the water supplier and the health agency.

(b) Double Check Valve Assembly. A double check valve assembly shall be located as close as practical to the user's connection and shall be installed above grade, if possible, and in a manner where it is readily accessible for testing and maintenance.

(c) Reduced Pressure Principle Backflow Prevention Device. A reduced pressure principle backflow prevention device shall be located as close as practical to the user's connection and shall be installed a minimum of twelve inches (12") above grade and not more than thirty-six inches (36") above grade measured from the bottom of the device and with a minimum of twelve inches (12") side clearance.

§7604. Type of protection required.

The type of protection that shall be provided to prevent backflow into the public water supply shall be commensurate with the degree of hazard that exists on the consumer's premises. The type of protective device that may be required (listed in an increasing level of protection) includes: Double check Valve Assembly--(DC), Reduced Pressure Principle Backflow Prevention Device--(RP) and an Air gap Separation--(AG). The water user may choose a higher level of protection than required by the water supplier. The minimum types of backflow protection required to protect the public water supply, at the water user's connection to premises with various degrees of hazard, are given in Table 1. Situations not covered in Table 1 shall be evaluated on a case-by-case basis and the appropriate backflow protection shall be determined by the water supplier or health agency.

TABLE 1
TYPE OF BACKFLOW PROTECTION REQUIRED

Degree of Hazard	Minimum Type of Backflow Prevention
(a) Sewage and Hazardous Substances	
(1) Premises where there are waste water pumping and/or treatment plants and there is no interconnection with the potable water system. This does not include a single-family residence that has a sewage lift pump. A RP be provided in lieu of an AG if approved by the health agency and water supplier.	AG
(2) Premises where hazardous substances are handled in any manner in which the substances may enter the potable water system. This does not include a single-family residence that has a sewage lift pump. A RP may be provided in lieu of an AG if approved by the health agency and water supplier.	AG
(3) Premises where there are irrigation systems into which fertilizers, herbicides, or pesticides are, or can be, injected.	RP
(b) Auxiliary Water Supplies	
(1) Premises where there is an unapproved auxiliary water supply which is interconnected with the public water system. A RP or DC may be provided in lieu of an AG if approved by the health agency and water supplier	AG
(2) Premises where there is an unapproved auxiliary RP water supply and there are no interconnections with the public water system. A DC may be provided in lieu of a RP if approved by the health agency and water supplier.	RP
(c) Recycled water	
(1) Premises where the public water system is used to supplement the recycled water supply.	AG
(2) Premises where recycled water is used, other than as allowed in paragraph (3), and there is no interconnection with the potable water system.	RP
(3) Residences using recycled water for landscape irrigation as part of an approved dual plumbed use area established pursuant to sections 60313 through 60316 unless the recycled water supplier obtains approval of the	DC

local public water supplier, or the Department if the water supplier is also the supplier of the recycled water, to utilize an alternative backflow protection plan that includes an annual inspection and annual shutdown test of the recycled water and potable water systems pursuant to subsection 60316(a).

(d) Fire Protection Systems

(1) Premises where the fire system is directly supplied from the public water system and there is an unapproved auxiliary water supply on or to the premises (not interconnected). DC

(2) Premises where the fire system is supplied from the public water system and interconnected with an unapproved auxiliary water supply. A RP may be provided in lieu of an AG if approved by the health agency and water supplier. AG

(3) Premises where the fire system is supplied from the public water system and where either elevated storage tanks or fire pumps which take suction from private reservoirs or tanks are used. DC

(4) Premises where the fire system is supplied from the public water system and where recycled water is used in a separate piping system within the same building. DC

(e) Dockside Watering Points and Marine Facilities

(1) Pier hydrants for supplying water to vessels for any purpose. RP

(2) Premises where there are marine facilities. RP

(f) Premises where entry is restricted so that inspections for cross-connections cannot be made with sufficient frequency or at sufficiently short notice to assure that do not exist. RP

(g) Premises where there is a repeated history of crossconnections being established or re-established. RP RP

§7605. Testing and maintenance of backflow preventers.

(a) The water supplier shall assure that adequate maintenance and periodic testing are provided by the water user to ensure their proper operation.

(b) Backflow preventers shall be tested by persons who have demonstrated their competency in testing of these devices to the water supplier or health agency.

(c) Backflow preventers shall be tested at least annually or more frequently if determined to be necessary by the health agency or water supplier. When devices are found to be defective, they shall be repaired or replaced in accordance with the provisions of this Chapter.

(d) Backflow preventers shall be tested immediately after they are installed, relocated or repaired and not placed in service unless they are functioning as required.

(e) The water supplier shall notify the water user when testing of backflow preventers is needed. The notice shall contain the date when the test must be completed.

(f) Reports of testing and maintenance shall be maintained by the water supplier for a minimum of three years.

TITLE 22 CODE OF REGULATIONS

Division 4. Environmental Health

Chapter 1. Introduction

Article 1. Definitions

§60001. Department.
Whenever the term "department" is used in this division, it means the State Department of Health Services, unless otherwise specified.

§60003. Director.
Whenever the term "director" is used in this division, it means the Director, State Department of Health Services, unless otherwise specified.

Chapter 2. Regulations for the Implementation of the California Environmental Quality

Article 1. General Requirements and Categorical Exemptions

§60100. General requirements.
The Department of Health Services incorporates by reference the objectives, criteria, and procedures as delineated in Chapters 1, 2, 2.5, 2.6, 3, 4, 5, and 6, Division 13, Public Resources Code, Sections 21000 et seq., and the Guidelines for the Implementation of the California Environmental Quality Act, Title 14, Division 6, Chapter 3, California Administrative Code, Sections 15000 et seq.

§60101. Specific activities within categorical exempt classes.
The following specific activities are determined by the Department to fall within the classes of categorical exemptions set forth in Sections 15300 et seq. of Title 14 of the California Administrative Code:

(a) Class 1: Existing Facilities.

(1) Any interior or exterior alteration of water treatment units, water supply systems, and pump station buildings where the alteration involves the addition, deletion, or modification of mechanical, electrical, or hydraulic controls.

(2) Maintenance, repair, replacement, or reconstruction to any water treatment process units, including structures, filters, pumps, and chlorinators.

(b) Class 2: Replacement or Reconstruction.

(1) Repair or replacement of any water service connections, meters, and valves for backflow prevention, air release, pressure regulating, shut-off and blow-off or flushing.

(2) Replacement or reconstruction of any existing water supply distribution lines, storage tanks and reservoirs of substantially the same size.

(3) Replacement or reconstruction of any water wells, pump stations and related appurtenances.

(c) Class 3: New Construction of Small Structures.

(1) Construction of any water supply and distribution lines of less than sixteen inches in diameter, and related appurtenances.

(2) Construction of any water storage tanks and reservoirs of less than 100,000 gallon capacity.

(d) Class 4: Minor Alterations to Land.

(1) Minor alterations to land, water, or vegetation on any officially existing designated wildlife management areas or fish production facilities for the purpose of reducing the environmental potential for nuisances or vector production.

(2) Any minor alterations to highway crossings for water supply and distribution lines.

Chapter 3. Water Recycling Criteria

Article 1. Definitions.

§60301.050. 24-hour Composite Sample.

"24-hour Composite Sample" means an aggregate sample derived from no fewer than eight discrete samples collected at equal time intervals or collected proportional to the flow rate over the compositing period. The aggregate sample shall reflect the average source water quality covering the composite 24-hour sample period.

§60301.080. Added Tracer.

"Added Tracer" means a non-reactive substance, with measureable characteristics distinctly different from the receiving groundwater, intentionally added to the water applied at a Groundwater Replenishment Reuse Project (GRRP) for the purpose of being a tracer such that the tracer can be readily identified in the groundwater downgradient of the GRRP to determine the underground retention time of the applied water.

§60301.100. Approved laboratory.

"Approved laboratory" means a laboratory that has been certified by the Department to perform microbiological analyses pursuant to section 116390, Health and Safety Code.

§60301.160. Coagulated wastewater.
"Coagulated wastewater" means oxidized wastewater in which colloidal and finely divided suspended matter have been destabilized and agglomerated upstream from a filter by the addition of suitable floc-forming chemicals.

§60301.170. Conventional treatment.
"Conventional treatment" means a treatment chain that utilizes a sedimentation unit process between the coagulation and filtration processes and produces an effluent that meets the definition for disinfected tertiary recycled water.

§60301.180. Department.
"Department" means the California Department of Public Health or its successor with authority to regulate public water systems.

§60301.190. Diluent Water.
"Diluent Water" means water, meeting the diluent requirements of this Chapter, used for reducing the recycled municipal wastewater contribution over time.

§60301.200. Direct beneficial use.
"Direct beneficial use" means the use of recycled water that has been transported from the point of treatment or production to the point of use without an intervening discharge to waters of the State.

§60301.220. Disinfected secondary-2.2 recycled water.
"Disinfected secondary-2.2 recycled water" means recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period.

§60301.225. Disinfected secondary-23 recycled water.
"Disinfected secondary-23 recycled water" means recycled water that has been oxidized and disinfected so that the median concentration of total coliform bacteria in the disinfected effluent does not exceed a most probable number (MPN) of 23 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed, and the number of total coliform bacteria does not exceed an MPN of 240 per 100 milliliters in more than one sample in any 30 day period.

§60301.230. Disinfected tertiary recycled water.
"Disinfected tertiary recycled water" means a filtered and subsequently disinfected wastewater that meets the following criteria:

(a) The filtered wastewater has been disinfected by either:

(1) A chlorine disinfection process following filtration that provides a CT (the product of total chlorine residual and modal contact time measured at the same point) value of not less than 450 milligram-minutes per liter at all times with a modal contact time of at least 90 minutes, based on peak dry weather design flow; or

(2) A disinfection process that, when combined with the filtration process, has been demonstrated to inactivate and/or remove 99.999 percent of the plaque forming units of F-specific bacteriophage MS2, or polio virus in the wastewater. A virus that is at least as resistant to disinfection as polio virus may be used for purposes of the demonstration.

(b) The median concentration of total coliform bacteria measured in the disinfected effluent does not exceed an MPN of 2.2 per 100 milliliters utilizing the bacteriological results of the last seven days for which analyses have been completed and the number of total coliform bacteria does not exceed an MPN of 23 per 100 milliliters in more than one sample in any 30 day period. No sample shall exceed an MPN of 240 total coliform bacteria per 100 milliliters.

§60301.240. Drift.
"Drift" means the water that escapes to the atmosphere as water droplets from a cooling system.

§60301.245. Drift eliminator.
"Drift eliminator" means a feature of a cooling system that reduces to a minimum the generation of drift from the system.

§60301.250. Dual plumbed system.
"Dual plumbed system" or "dual plumbed" means a system that utilizes separate piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following purposes:

(a) To serve plumbing outlets (excluding fire suppression systems) within a building or

(b) Outdoor landscape irrigation at individual residences.

§60301.300. F-Specific bacteriophage MS-2.
"F-specific bacteriophage MS-2" means a strain of a specific type of virus that infects coliform bacteria that is traceable to the American Type Culture Collection (ATCC15597B1) and is grown on lawns of E. coli (ATCC 15597).

§60301.310. Facility.
"Facility" means any type of building or structure, or a defined area of specific use that receives water for domestic use from a public water system as defined in section 116275 of the Health and Safety Code.

§60301.320. Filtered wastewater.
"Filtered wastewater" means an oxidized wastewater that meets the criteria in subsection (a) or (b):

(a) Has been coagulated and passed through natural undisturbed soils or a bed of filter media pursuant to the following:

(1) At a rate that does not exceed 5 gallons per minute per square foot of surface area in mono, dual or mixed media gravity, upflow or pressure filtration systems, or does not exceed 2 gallons per minute per square foot of surface area in traveling bridge automatic backwash filters; and

(2) So that the turbidity of the filtered wastewater does not exceed any of the following:

(A) An average of 2 NTU within a 24-hour period;

(B) 5 NTU more than 5 percent of the time within a 24-hour period; and

(C) 10 NTU at any time.

(b) Has been passed through a microfiltration, ultrafiltration, nanofiltration, or reverse osmosis membrane so that the turbidity of the filtered wastewater does not exceed any of the following:

(1) 0.2 NTU more than 5 percent of the time within a 24-hour period; and

(2) 0.5 NTU at any time.

§60301.330. Food crops.
"Food crops" means any crops intended for human consumption.

§60301.370. Groundwater.
"Groundwater" means water below the land surface in a saturated zone.

§60301.390. Groundwater Replenishment Reuse Project or GRRP.
"Groundwater Replenishment Reuse Project" or "GRRP" means a project involving the planned use of recycled municipal wastewater that is operated for the purpose of replenishing a groundwater basin designated in the Water Quality Control Plan [as defined in Water Code section 13050(j)] for use as a source of municipal and domestic water supply.

§60301.400. Hose bib.
"Hose bib" means a faucet or similar device to which a common garden hose can be readily attached.

§60301.450. Indicator Compound.
"Indicator Compound" means an individual chemical in a GRRP's municipal wastewater that represents the physical, chemical, and biodegradable characteristics of a specific family of trace organic chemicals; is present in concentrations that provide information relative to the environmental fate and transport of those chemicals; may be used to monitor the efficiency of trace organic compounds removal by treatment processes; and provides an indication of treatment process failure.

§60301.455. Intrinsic Tracer.
"Intrinsic Tracer" means a substance or attribute present in the recharge water at levels different from the receiving groundwater such that the substance in the water applied at the GRRP can be distinctly and sufficiently detected in the groundwater downgradient of the GRRP to determine the underground retention time of the water.

§60301.550. Landscape impoundment.
"Landscape impoundment" means an impoundment in which recycled water is stored or used for aesthetic enjoyment or landscape irrigation, or which otherwise serves a similar function and is not intended to include public contact.

§60301.575. Maximum Contaminant Level or MCL.
"Maximum Contaminant Level" or "MCL" means the maximum permissible concentration of a contaminant established pursuant to sections 116275(c)(1) and (d) of the Health and Safety Code or established by the U.S. Environmental Protection Agency.

§60301.600. Modal contact time.
"Modal contact time" means the amount of time elapsed between the time that a tracer, such as salt or dye, is injected into the influent at the entrance to a chamber and the time that the highest concentration of the tracer is observed in the effluent from the chamber.

§60301.620. Nonrestricted recreational impoundment.
"Nonrestricted recreational impoundment" means an impoundment of recycled water, in which no limitations are imposed on body-contact water recreational activities.

§60301.625. Notification Level or NL.
"Notification Level" or "NL" means the concentration of a contaminant established by the Department pursuant to section 116455 of the Health and Safety Code.

§60301.630. NTU.
"NTU" (Nephelometric turbidity unit) means a measurement of turbidity as determined by the ratio of the intensity of light scattered by the sample to the intensity of incident light as measured by method 2130 B. in Standard Methods for the Examination of Water and Wastewater, 20th ed.; Eaton, A. D., Clesceri, L. S., and Greenberg, A. E., Eds; American Public Health Association: Washington, DC, 1995; p. 2-8.

§60301.650. Oxidized wastewater.
"Oxidized wastewater" means wastewater in which the organic matter has been stabilized, is nonputrescible, and contains dissolved oxygen.

§60301.660. Peak dry weather design flow.
"Peak Dry Weather Design Flow" means the arithmetic mean of the maximum peak flow rates sustained over some period of time (for example three hours) during the maximum 24-hour dry weather period. Dry weather period is defined as periods of little or no rainfall.

§60301.670. Project Sponsor.
"Project Sponsor" means an entity subject to a Regional Water Quality Control Board's (Regional Board's) water recycling requirements for a Groundwater Replenishment Reuse Project (GRRP) and is, in whole or part, responsible for applying to the Regional Board for a permit, obtaining a permit, operation of a GRRP, and complying with the terms and conditions of the permit and the requirements of this Chapter.

§60301.680. Public Water System.
"Public Water System" has the same meaning as defined in section 116275(h) of the Health and Safety Code.

§60301.685. Recharge Water.
"Recharge Water" means recycled municipal wastewater, or the combination of recycled municipal wastewater and credited diluent water, which is utilized by a GRRP for groundwater replenishment.

§60301.690. Recycled Municipal Wastewater.
"Recycled Municipal Wastewater" means recycled water that is the effluent from the treatment of wastewater of municipal origin.

§60301.700. Recycled water agency.
"Recycled water agency" means the public water system, or a publicly or privately owned or operated recycled water system, that delivers or proposes to deliver recycled water to a facility.

§60301.705. Recycled Municipal Wastewater Contribution or RWC.
"Recycled Municipal Wastewater Contribution" or "RWC" means the fraction equal to the quantity of recycled municipal wastewater applied at the GRRP divided by the sum of the quantity of recycled municipal wastewater and credited diluent water.

§60301.710. Recycling plant.
"Recycling plant" means an arrangement of devices, structures, equipment, processes and controls which produce recycled water.

§60301.740. Regulatory agency.
"Regulatory agency" means the California Regional Water Quality Control Board(s) that have jurisdiction over the recycling plant and use areas.

§60301.750. Restricted access golf course.
"Restricted access golf course" means a golf course where public access is controlled so that areas irrigated with recycled water cannot be used as if they were part of a park, playground, or school yard and where irrigation is conducted only in areas and during periods when the golf course is not being used by golfers.

§60301.760. Restricted recreational impoundment.
"Restricted recreational impoundment" means an impoundment of recycled water in which recreation is limited to fishing, boating, and other non-body-contact water recreational activities.

§60301.770. Regional Board.
"Regional Board" means the Regional Water Quality Control Board.

§60301.780. Saturated Zone.
"Saturated Zone" means an underground region or regions in which all interstices in, between, and below natural geologic materials are filled with water, with the uppermost surface of the saturated zone being the water table.

§60301.800. Spray irrigation.
"Spray irrigation" means the application of recycled water from sprinklers to crops or vegetation.

§60301.810. Spreading Area.
"Spreading Area" means a natural or constructed impoundment with a depth equal to or less than its widest surface dimension used by a GRRP to replenish a groundwater basin with recharge water infiltrating and percolating through a zone that, in the absence of a GRRP, would be an unsaturated zone.

§60301.830. Standby unit process.
"Standby unit process" means an alternate unit process or an equivalent alternative process which is maintained in operable condition and which is capable of providing comparable treatment of the actual flow through the unit for which it is a substitute.

§60301.840. Subsurface Application.
"Subsurface Application" means the application of recharge water to a groundwater basin(s) by a means other than surface application.

§60301.850. Surface Application.
"Surface Application" means the application of recharge water to a spreading area.

§60301.855. Surrogate Parameter.
"Surrogate Parameter" means a measurable physical or chemical property that has been demonstrated to provide a direct correlation with the concentration of an indicator compound, can be used to monitor the efficiency of trace organic compounds removal by a treatment process, and/or provides an indication of a treatment process failure.

§60301.860. Total Nitrogen.
"Total Nitrogen" means the sum of concentrations of ammonia, nitrite, nitrate, and organic nitrogen-containing compounds, expressed as nitrogen.

§60301.870. Total Organic Carbon or TOC.
"Total Organic Carbon" or "TOC" means the concentration of organic carbon present in water.

§60301.900. Undisinfected secondary recycled water.
"Undisinfected secondary recycled water" means oxidized wastewater.

§60301.910. Unsaturated Zone.
"Unsaturated Zone" means the volume between the land surface and the uppermost saturated zone.

§60301.920. Use area.
"Use area" means an area of recycled water use with defined boundaries. A use area may contain one or more facilities.

Article 2. Sources of Recycled Water.

§60302. Source specifications.

The requirements in this chapter shall only apply to recycled water from sources that contain domestic waste, in whole or in part.

Article 3. Uses of Recycled Water.

§60303. Exceptions.

The requirements set forth in this chapter shall not apply to the use of recycled water onsite at a water recycling plant, or wastewater treatment plant, provided access by the public to the area of onsite recycled water use is restricted.

§60304. Use of recycled water for irrigation.

(a) Recycled water used for the surface irrigation of the following shall be a disinfected tertiary recycled water, except that for filtration pursuant to Section 60301.320(a) coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes:

(1) Food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop,

(2) Parks and playgrounds,

(3) School yards,

(4) Residential landscaping,

(5) Unrestricted access golf courses, and

(6) Any other irrigation use not specified in this section and not prohibited by other sections of the California Code of Regulations.

(b) Recycled water used for the surface irrigation of food crops where the edible portion is produced above ground and not contacted by the recycled water shall be at least disinfected secondary-2.2 recycled water.

(c) Recycled water used for the surface irrigation of the following shall be at least disinfected secondary-23 recycled water:

(1) Cemeteries,

(2) Freeway landscaping,

(3) Restricted access golf courses,

(4) Ornamental nursery stock and sod farms where access by the general public is not restricted,

(5) Pasture for animals producing milk for human consumption, and

(6) Any nonedible vegetation where access is controlled so that the irrigated area cannot be used as if it were part of a park, playground or school yard

(d) Recycled wastewater used for the surface irrigation of the following shall be at least undisinfected secondary recycled water:

(1) Orchards where the recycled water does not come into contact with the edible portion of the crop,

(2) Vineyards where the recycled water does not come into contact with the edible portion of the crop,

(3) Non food-bearing trees (Christmas tree farms are included in this category provided no irrigation with recycled water occurs for a period of 14 days prior to harvesting or allowing access by the general public),

(4) Fodder and fiber crops and pasture for animals not producing milk for human consumption,

(5) Seed crops not eaten by humans,

(6) Food crops that must undergo commercial pathogen-destroying processing before being consumed by humans, and

(7) Ornamental nursery stock and sod farms provided no irrigation with recycled water occurs for a period of 14 days prior to harvesting, retail sale, or allowing access by the general public.

(e) No recycled water used for irrigation, or soil that has been irrigated with recycled water, shall come into contact with the edible portion of food crops eaten raw by humans unless the recycled water complies with subsection (a).

§60305. Use of recycled water for impoundments.

(a) Except as provided in subsection (b), recycled water used as a source of water supply for nonrestricted recreational impoundments shall be disinfected tertiary recycled water that has been subjected to conventional treatment.

(b) Disinfected tertiary recycled water that has not received conventional treatment may be used for nonrestricted recreational impoundments provided the recycled water is monitored for the presence of pathogenic organisms in accordance with the following:

(1) During the first 12 months of operation and use the recycled water shall be sampled and analyzed monthly for *Giardia*, enteric viruses, and *Cryptosporidium*. Following the first 12 months of use, the recycled water shall be sampled and analyzed quarterly for *Giardia*, enteric viruses, and *Cryptosporidium*. The ongoing monitoring may be discontinued after the first two years of operation with the approval of the

department. This monitoring shall be in addition to the monitoring set forth in section 60321.

(2) The samples shall be taken at a point following disinfection and prior to the point where the recycled water enters the use impoundment. The samples shal be analyzed by an approved laboratory and the results submitted quarterly to the regulatory agency.

(c) The total coliform bacteria concentrations in recycled water used for nonrestricted recreational impoundments, measured at a point between the disinfection process and the point of entry to the use impoundment, shall comply with the criteria specified in section 60301.230 (b) for disinfected tertiary recycled water.

(d) Recycled water used as a source of supply for restricted recreational impoundments and for any publicly accessible impoundments at fish hatcheries shall be at least disinfected secondary-2.2 recycled water.

(e) Recycled water used as a source of supply for landscape impoundments that do not utilize decorative fountains shall be at least disinfected secondary-23 recycled water.

§60306. Use of recycled water for cooling.

(a) Recycled water used for industrial or commercial cooling or air conditioning that involves the use of a cooling tower, evaporative condenser, spraying or any mechanism that creates a mist shall be a disinfected tertiary recycled water.

(b) Use of recycled water for industrial or commercial cooling or air conditioning that does not involve the use of a cooling tower, evaporative condenser, spraying, or any mechanism that creates a mist shall be at least disinfected secondary-23 recycled water.

(c) Whenever a cooling system, using recycled water in conjunction with an air conditioning facility, utilizes a cooling tower or otherwise creates a mist that could come into contact with employees or members of the public, the cooling system shall comply with the following:

(1) A drift eliminator shall be used whenever the cooling system is in operation.

(2) A chlorine, or other, biocide shall be used to treat the cooling system recirculating water to minimize the growth of *Legionella* and other microorganisms.

§60307. Use of recycled water for other purposes.

(a) Recycled water used for the following shall be disinfected tertiary recycled water, except that for filtration being provided pursuant to Section 60301.320(a) coagulation need not be used as part of the treatment process provided that the filter effluent turbidity does not exceed 2 NTU, the turbidity of the influent to the filters is continuously measured, the influent turbidity does not exceed 5 NTU for more than 15 minutes and never exceeds 10 NTU, and that there is the capability to automatically activate chemical addition or divert the wastewater should the filter influent turbidity exceed 5 NTU for more than 15 minutes:

(1) Flushing toilets and urinals,
(2) Priming drain traps,
(3) Industrial process water that may come into contact with workers,
(4) Structural fire fighting,
(5) Decorative fountains,
(6) Commercial laundries,
(7) Consolidation of backfill around potable water pipelines,
(8) Artificial snow making for commercial outdoor use, and
(9) Commercial car washes, including hand washes if the recycled water is not heated, where the general public is excluded from the washing process.

(b) Recycled water used for the following uses shall be at least disinfected secondary-23 recycled water:

(1) Industrial boiler feed,
(2) Nonstructural fire fighting,
(3) Backfill consolidation around nonpotable piping,
(4) Soil compaction,
(5) Mixing concrete,
(6) Dust control on roads and streets,
(7) Cleaning roads, sidewalks and outdoor work areas and
(8) Industrial process water that will not come into contact with workers.

(c) Recycled water used for flushing sanitary sewers shall be at least undisinfected secondary recycled water.

Article 4. Use Area Requirements.

§60310. Use area requirements.

(a) No irrigation with disinfected tertiary recycled water shall take place within 50 feet of any domestic water supply well unless all of the following conditions have been met:

(1) A geological investigation demonstrates that an aquitard exists at the well between the uppermost aquifer being drawn from and the ground surface.

(2) The well contains an annular seal that extends from the surface into the aquitard.

(3) The well is housed to prevent any recycled water spray from coming into contact with the wellhead facilities.

(4) The ground surface immediately around the wellhead is contoured to allow surface water to drain away from the well.

(5) The owner of the well approves of the elimination of the buffer zone requirement.

(b) No impoundment of disinfected tertiary recycled water shall occur within 100 feet of any domestic water supply well.

(c) No irrigation with, or impoundment of, disinfected secondary-2.2 or disinfected secondary-23 recycled water shall take place within 100 feet of any domestic water supply well.

(d) No irrigation with, or impoundment of, undisinfected secondary recycled water shall take place within 150 feet of any domestic water supply well.

(e) Any use of recycled water shall comply with the following:

(1) Any irrigation runoff shall be confined to the recycled water use area, unless the runoff does not pose a public health threat and is authorized by the regulatory agency.

(2) Spray, mist, or runoff shall not enter dwellings, designated outdoor eating areas, or food handling facilities.

(3) Drinking water fountains shall be protected against contact with recycled water spray, mist, or runoff.

(f) No spray irrigation of any recycled water, other than disinfected tertiary recycled water, shall take place within 100 feet of a residence or a place where public exposure could be similar to that of a park, playground, or school yard.

(g) All use areas where recycled water is used that are accessible to the public shall be posted with signs that are visible to the public, in a size no less than 4 inches high by 8 inches wide, that include the following wording : "RECYCLED WATER - DO NOT DRINK". Each sign shall display an international symbol similar to that shown in figure 60310-A. The Department may accept alternative signage and wording, or an educational program, provided the applicant demonstrates to the Department that the alternative approach will assure an equivalent degree of public notification.

(h) Except as allowed under section 7604 of title 17, California Code of Regulations, no physical connection shall be made or allowed to exist between any recycled water system and any separate system conveying potable water.

(i) Except for use in a cemetery that complies with the requirements of section 8118 of the Health and Safety Code, the portions of the recycled water piping system that are in areas subject to access by the general public shall not include any hose bibs. Only quick couplers that differ from those used on the potable water system shall be used on the portions of the recycled water piping system in areas subject to public access.

Water Recycling Criteria

FIGURE 60310-A

Article 5. Dual Plumbed Recycled Water Systems.

§60313. General requirements.

(a) No person other than a recycled water agency shall deliver recycled water to a dual plumbed facility.

(b) Except as allowed pursuant to section 13553(d) of the Water Code, a recycled water agency shall not deliver recycled water for any internal use to any individually-owned residential units including free-standing structures, multiplexes, or condominiums.[1]

(c) No recycled water agency shall deliver recycled water for internal use except for fire suppression systems, to any facility that produces or processes food products or beverages. For purposes of this Subsection, cafeterias or snack bars in a facility whose primary function does not involve the production or processing of foods or beverages are not considered facilities that produce or process foods or beverages.

(d) No recycled water agency shall deliver recycled water to a facility using a dual plumbed system unless the report required pursuant to section 13522.5 of the Water Code, and which meets the requirements set forth in section 60314, has been submitted to, and approved by, the regulatory agency.

§60314. Report submittal.

(a) For dual-plumbed recycled water systems, the report submitted pursuant to section13522.5 of the Water Code shall contain the following information in addition to the information required by section 60323:

(1) A detailed description of the intended use area identifying the following:

(A) The number, location, and type of facilities within the use area proposing to use dual plumbed systems,

(B) The average number of persons estimated to be served by each facility on a daily basis,

(C) The specific boundaries of the proposed use area including a map showing the location of each facility to be served,

(D) The person or persons responsible for operation of the dual plumbed system at each facility, and

(E) The specific use to be made of the recycled water at each facility.

(2) Plans and specifications describing the following:

(A) Proposed piping system to be used,

(B) Pipe locations of both the recycled and potable systems,

[1] AB 1406, Chapter 537, Statutes of 2007, Water Code 13553, et seq., allows condominiums to be plumbed with recycled water, subject to a number of provisions.

(C) Type and location of the outlets and plumbing fixtures that will be accessible to the public, and

(D) The methods and devices to be used to prevent backflow of recycled water into the public water system.

(3) The methods to be used by the recycled water agency to assure that the installation and operation of the dual plumbed system will not result in cross connections between the recycled water piping system and the potable water piping system. This shall include a description of pressure, dye or other test methods to be used to test the system every four years.

(b) A master plan report that covers more than one facility or use site may be submitted provided the report includes the information required by this section. Plans and specifications for individual facilities covered by the report may be submitted at any time prior to the delivery of recycled water to the facility.

§60315. Design requirements.

The public water supply shall not be used as a backup or supplemental source of water for a dual-plumbed recycled water system unless the connection between the two systems is protected by an air gap separation which complies with the requirements of sections 7602 (a) and 7603 (a) of title 17, California Code of Regulations, and the approval of the public water system has been obtained.

§60316. Operation requirements.

(a) Prior to the initial operation of the dual-plumbed recycled water system and annually thereafter, the Recycled Water Agency shall ensure that the dual plumbed system within each facility and use area is inspected for possible cross connections with the potable water system. The recycled water system shall also be tested for possible cross connections at least once every four years. The testing shall be conducted in accordance with the method described in the report submitted pursuant to section 60314. The inspections and the testing shall be performed by a cross connection control specialist certified by the California-Nevada section of the American Water Works Association or an organization with equivalent certification requirements. A written report documenting the result of the inspection or testing for the prior year shall be submitted to the department within 30 days following completion of the inspection or testing.

(b) The recycled water agency shall notify the department of any incidence of backflow from the dual-plumbed recycled water system into the potable water system within 24 hours of the discovery of the incident.

(c) Any backflow prevention device installed to protect the public water system serving the dual-plumbed recycled water system shall be inspected and maintained in accordance with section 7605 of Title 17, California Code of Regulations.

Article 5.1. Indirect Potable Reuse: Groundwater Replenishment – Surface Application.

~~§60320. Groundwater recharge.~~ ***(repealed)***

~~(a) Reclaimed water used for groundwater recharge of domestic water supply aquifers by surface spreading shall be at all times of a quality that fully protects public health. The State Department of Health Services' recommendations to the Regional Water Quality Control Boards for proposed groundwater recharge projects and for expansion of existing projects will be made on an individual case basis where the use of reclaimed water involves a potential risk to public health.~~

~~(b) The State Department of Health Services' recommendations will be based on all relevant aspects of each project, including the following factors: treatment provided; effluent quality and quantity; spreading area operations; soil characteristics; hydrogeology; residence time; and distance to withdrawal.~~

~~(c) The State Department of Health Services will hold a public hearing prior to making the final determination regarding the public health aspects of each groundwater recharge project. Final recommendations will be submitted to the Regional Water Quality Control Board in an expeditious manner.~~

§60320.100. General Requirements.

(a) The requirements of this Article apply to Groundwater Replenishment Reuse Projects (GRRPs) utilizing surface application, which receive initial permits from the Regional Board after June 18, 2014. Within 12 months after June 18, 2014, a project sponsor for a GRRP permitted on or before June 18, 2014, shall submit a report to the Department and appropriate Regional Board assessing its compliance with the requirements of this Article. For each requirement considered noncompliant and applicable by the Department or Regional Board, a project sponsor shall submit a schedule to the Department and Regional Board, for demonstrating and/or achieving compliance with the applicable requirements of this Article. Unless directed otherwise by the Department, a project sponsor's report for a GRRP permitted on or before June 18, 2014, need not assess compliance with requirements of this Article that are required to be met prior to operation of a GRRP, except subsection (b) of this section. The report is subject to review and approval by the Department and Regional Board.

(b) Prior to operation of a GRRP, the GRRP's project sponsor shall obtain Department approval of a plan describing the steps a project sponsor will take to provide an alternative source of drinking water supply to all users of a producing drinking water well, or a Department-approved treatment mechanism a project sponsor will provide to all owners of a producing drinking water well, that as a result of the GRRP's operation, as determined by the Department:

(1) violates a California or federal drinking water standard;

(2) has been degraded to the degree that it is no longer a safe source of drinking water; or

(3) receives water that fails to meet section 60320.108.

(c) Prior to operating a GRRP, a project sponsor shall collect at least four samples, at least one sample each quarter, from each potentially affected aquifer. The samples shall be representative of water in each aquifer, taking into consideration seasonal variations, and be analyzed for the chemicals, contaminants, and characteristics pursuant to sections 60320.110, 60320.112, 60320.118, and 60320.120.

(d) A GRRP's recycled municipal wastewater shall be retained underground for a period of time no less than the retention time required pursuant to sections 60320.108 and 60320.124. The GRRP shall be designed and operated in a manner that ensures water treated pursuant to this Article, beyond the boundary described in subsection (e)(2), meets the recycled municipal wastewater contributions (RWC) requirements in section 60320.116.

(e) Based on hydrogeologic flowpaths, a GRRP's project sponsor shall provide the Department, Regional Board, and local well-permitting authorities a map of the GRRP site at a scale of 1:24,000 or larger (1 inch equals 2,000 feet or 1 inch equals less than 2,000 feet) or, if necessary, a site sketch at a scale providing more detail, that clearly indicates the criteria in paragraphs (1) – (4) below. A revised map shall be prepared and provided when conditions change such that the previous map no longer accurately reflects current conditions.

(1) the location and boundaries of the GRRP;

(2) a boundary representing a zone of controlled drinking water well construction, the greatest of the horizontal and vertical distances reflecting the retention times required pursuant to sections 60320.108 and 60320.124;

(3) a secondary boundary representing a zone of potential controlled drinking water well construction, depicting the zone within which a well would extend the boundary in paragraph (2) to include existing or potential future drinking water wells, thereby requiring further study and potential mitigating activities prior to drinking water well construction; and

(4) the location of all monitoring wells established pursuant to section 60320.126, and drinking water wells within two years travel time of the GRRP based on groundwater flow directions and velocities expected under GRRP operating conditions.

(f) Prior to operating a GRRP, a project sponsor shall demonstrate to the Department and Regional Board that a project sponsor possesses adequate managerial and technical capability to assure compliance with this Article.

(g) Prior to replenishing a groundwater basin or an aquifer with recycled municipal wastewater, a GRRP's project sponsor shall demonstrate that all treatment processes have been installed and can be operated by a project sponsor to achieve their intended function. A protocol describing the actions to be taken to meet this subsection shall be included in the engineering report submitted pursuant section 60323.

(h) In the engineering report required pursuant to section 60323, a project sponsor for a GRRP shall include a hydrogeological assessment of the proposed GRRP's setting. The assessment shall include the following:

(1) the qualifications of the individual(s) preparing the assessment;

(2) a general description of geologic and hydrogeological setting of the groundwater basin(s) potentially directly impacted by the GRRP;

(3) a detailed description of the stratigraphy beneath the GRRP, including the composition, extent, and physical properties of the affected aquifers; and

(4) based on at least four rounds of consecutive quarterly monitoring to capture seasonal impacts;

(A) the existing hydrogeology and the hydrogeology anticipated as a result of the operation of the GRRP, and

(B) maps showing quarterly groundwater elevation contours, along with vector flow directions and calculated hydraulic gradients.

(i) If a project sponsor fails to complete compliance monitoring required pursuant to this Article, the Regional Board may determine water quality-related compliance based on available data.

(j) A project sponsor shall ensure that the recycled municipal wastewater used for a GRRP shall be from a wastewater management agency that is not in violation of the effluent limits pertaining to groundwater replenishment pursuant to this Article, as established in the wastewater management agency's Regional Board permit.

(k) If a project sponsor has been directed by the Department or Regional Board to suspend surface application pursuant to this Article, surface application shall not resume until the project sponsor has obtained Department and Regional Board approval.

§60320.102. Public Hearing.

(a) A public hearing for a GRRP shall be held by a project sponsor prior to the Department's submittal of its recommendations to the Regional Board for the GRRP's initial permit and any time an increase in maximum RWC has been proposed but not addressed in a prior public hearing. Prior to a public hearing conducted pursuant to this section, a project sponsor shall provide the Department, for its review and approval, the information a project sponsor intends to present at the hearing. Following the Department's approval of the information, a project sponsor shall place the information on a project sponsor's Web site and in a repository that provides at least 30 days of public access to the information prior to the public hearing.

(b) Prior to placing the information required pursuant to subsection (a) in a repository, a project sponsor shall:

(1) Notify the public of the following;

(A) the location and hours of operation of the repository,

(B) the Internet address where the information may be viewed,

(C) the purpose of the repository and public hearing,

(D) the manner in which the public can provide comments, and

(E) the date, time, and location of the public hearing; and

(2) At a minimum, notify the first downgradient drinking water well owner and well owners whose drinking water well is within 10 years from the GRRP based on groundwater flow directions and velocities.

(c) Unless directed otherwise by the Department, the public notification made pursuant to subsection (b)(2) shall be by direct mail and the notification made pursuant to subsection (b)(1) shall be delivered in a manner to reach persons whose source of drinking water may be impacted by the GRRP, using one or more of the following methods:

(1) local newspaper(s) publication of general circulation;

(2) mailed or direct delivery of a newsletter;

(3) conspicuously placed statement in water bills; and/or

(4) television and/or radio.

§60320.104. Lab Analyses.

(a) Analyses for contaminants having primary or secondary MCLs shall be performed by laboratories approved to perform such analyses by the Department utilizing Department-approved drinking water methods.

(b) Analyses for chemicals other than those having primary or secondary MCLs shall be described in the GRRP's Operation Optimization Plan prepared pursuant to section 60320.122.

§60320.106. Wastewater Source Control.

A project sponsor shall ensure that the recycled municipal wastewater used for a GRRP shall be from a wastewater management agency that:

(a) administers an industrial pretreatment and pollutant source control program; and

(b) implements and maintains a source control program that includes, at a minimum;

(1) an assessment of the fate of Department-specified and Regional Board-specified chemicals and contaminants through the wastewater and recycled municipal wastewater treatment systems,

(2) chemical and contaminant source investigations and monitoring that focuses on Department-specified and Regional Board-specified chemicals and contaminants,

(3) an outreach program to industrial, commercial, and residential communities within the portions of the sewage collection agency's service area that flows into the water reclamation plant subsequently supplying the GRRP, for the purpose of managing and minimizing the discharge of chemicals and contaminants at the source, and

(4) a current inventory of chemicals and contaminants identified pursuant to this section, including new chemicals and contaminants resulting from new sources or changes to existing sources, that may be discharged into the wastewater collection system.

§60320.108. Pathogenic Microorganism Control.

(a) A project sponsor shall design and operate a GRRP such that the recycled municipal wastewater used as recharge water for a GRRP receives treatment that achieves at least 12-log enteric virus reduction, 10-log Giardia cyst reduction, and 10-log Cryptosporidium oocyst reduction. The treatment train shall consist of at least three separate treatment processes. Except as provided in subsection (c), for each pathogen (i.e., virus, Giardia cyst, or Cryptosporidium oocyst), a separate treatment process may be credited with no more than 6-log reduction, with at least three processes each being credited with no less than 1.0-log reduction.

(b) At a minimum, the recycled municipal wastewater applied at a GRRP shall receive treatment that meets:

(1) the definition of filtered wastewater, pursuant to section 60301.320; and

(2) the definition of disinfected tertiary recycled water, pursuant to section 60301.230.

(c) For each month retained underground as demonstrated in subsection (e), the recycled municipal wastewater or recharge water will be credited with 1-log virus reduction. A GRRP meeting subsections (b)(1) and (2) or providing advanced treatment in accordance with section 60320.201 for the entire flow of the recycled municipal wastewater used for groundwater replenishment, that also demonstrates at least six months retention underground pursuant to subsection (e), will be credited with 10-log Giardia cyst reduction and 10-log Cryptosporidium oocyst reduction.

(d) With the exception of log reduction credited pursuant to subsection (c), a project sponsor shall validate each of the treatment processes used to meet the requirements in subsection (a) for their log reduction by submitting a report for the Department's review and approval, or by using a challenge test approved by the Department, that provides evidence of the treatment process's ability to reliably and consistently achieve the log reduction. The report and/or challenge test shall be prepared by an engineer licensed in California with at least five years of experience, as a licensed engineer, in wastewater treatment and public water supply, including the evaluation of treatment processes for pathogen control. With the exception of retention time underground and a soil-aquifer treatment process, a project sponsor shall propose and include in its Operation Optimization Plan prepared pursuant to section 60320.122, on-going monitoring using the pathogenic microorganism of concern or a microbial, chemical, or physical surrogate parameter(s) that verifies the performance of each treatment process's ability to achieve its credited log reduction.

(e) To demonstrate the retention time underground in subsection (c), a tracer study utilizing an added tracer shall be implemented under hydraulic conditions representative of normal GRRP operations. The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reached the monitoring point. A project sponsor for a GRRP shall initiate the tracer study prior to the end of the third month of operation. A project sponsor for a GRRP permitted on or before June 18, 2014, that has not already performed such a tracer study shall complete a tracer study demonstrating the retention time underground. With Department approval, an intrinsic tracer may be used in lieu of an added tracer, with no more credit provided than the corresponding virus log reduction in column 2 of Table 60320.108.

(f) For the purpose of siting a GRRP location during project planning and until a GRRP's project sponsor has met the requirements of subsection (e), for each month of retention time estimated using the method in column 1, the recycled municipal wastewater or recharge water shall be credited with no more than the corresponding virus log reduction in column 2 of Table 60320.108.

Table 60320.108

Column 1	Column 2
Method used to estimate the retention time to the nearest downgradient drinking water well	**Virus Log Reduction Credit per Month**
Tracer study utilizing an added tracer.[1]	1.0 log
Tracer study utilizing an intrinsic tracer.[1]	0.67 log
Numerical modeling consisting of calibrated finite element or finite difference models using validated and verified computer codes used for simulating groundwater flow.	0.50 log
Analytical modeling using existing academically-accepted equations such as Darcy's Law to estimate groundwater flow conditions based on simplifying aquifer assumptions.	0.25 log

[1] The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reached the monitoring point.

(g) A project sponsor shall obtain Department approval for the protocol(s) to be used to establish the retention times in subsections (e) and (f).

(h) Based on changes in hydrogeological or climatic conditions since the most recent demonstration, the Department may require a GRRP's project sponsor to demonstrate that the underground retention times required in this section are being met.

(i) If a pathogen reduction in subsection (a) is not met based on the on-going monitoring required pursuant to subsection (d), within 24 hours of being aware a project sponsor shall immediately investigate the cause and initiate corrective actions. The project sponsor shall immediately notify the Department and Regional Board if the GRRP fails to meet the pathogen reduction criteria longer than 4 consecutive hours, or more than a total of 8 hours during any 7-day period. Failures of shorter duration shall be reported to the Regional Board by a project sponsor no later than 10 days after the month in which the failure occurred.

(j) If the effectiveness of a treatment train's ability to reduce enteric virus is less than 10-logs, or Giardia cyst or Cryptosporidium oocyst reduction is less than 8-logs, a project sponsor shall immediately notify the Department and Regional Board, and discontinue application of recycled municipal wastewater at the GRRP, unless directed otherwise by the Department or Regional Board.

§60320.110. Nitrogen Compounds Control.

(a) To demonstrate control of the nitrogen compounds, a project sponsor shall:

(1) Each week, at least three days apart as specified in the GRRP's Operation Optimization Plan, collect at least two total nitrogen samples (grab or 24-hour composite) representative of the recycled municipal wastewater or recharge water applied throughout the spreading area. Samples may be collected before or after surface application;

(2) Have the samples collected pursuant to paragraph (1) analyzed for total nitrogen, with the laboratory being required by a project sponsor to complete each analysis within 72 hours and have the result reported to a project sponsor within the same 72 hours if the result of any single sample exceeds 10 mg/L;

(3) If the average of the results of two consecutive samples collected pursuant to paragraph (1) exceeds 10 mg/L total nitrogen;

(A) take a confirmation sample and notify the Department and the Regional Board within 48 hours of being notified of the results by the laboratory,

(B) investigate the cause for the exceedances and take actions to reduce the total nitrogen concentrations to ensure continued or future exceedances do not occur, and

(C) initiate additional monitoring for nitrogen compounds as described in the GRRP's Operation Optimization Plan, including locations in the groundwater basin and spreading area, to identify elevated concentrations and determine whether such elevated concentrations exceed or may lead to an exceedance of a nitrogen-based MCL; and

(4) If the average of the results of four consecutive samples collected pursuant to paragraph (1) exceeds 10 mg/L total nitrogen, suspend the surface application of recycled municipal wastewater. Surface application shall not resume until corrective actions have been taken and at least two consecutive total nitrogen sampling results are less than 10 mg/L.

(b) As determined by the Department and based on a GRRP's operation, including but not limited to the time the spreading area is out of service and utilization of a denitrification process, a project sponsor shall initiate additional monitoring for nitrogen compounds to identify elevated concentrations in the groundwater and determine whether such elevated concentrations exceed or may lead to an exceedance of a nitrogen-based MCL.

(c) Following Department and Regional Board approval, a project sponsor may initiate reduced monitoring frequencies for total nitrogen. A project sponsor may apply to the Department and Regional Board for reduced monitoring frequencies for total nitrogen if, for the most recent 24 months:

(1) the average of all results did not exceed 5 mg/L total nitrogen; and

(2) the average of a result and its confirmation sample (taken within 24 hours of receipt of the initial result) did not exceed 10 mg/L total nitrogen.

(d) If the results of reduced monitoring conducted as approved pursuant to subsection (c) exceed the total nitrogen concentration criteria in subsection (c), a project sponsor shall revert to the monitoring frequencies for total nitrogen prior to implementation of the reduced frequencies. Reduced frequency monitoring shall not resume unless the requirements of subsection (c) are met.

§60320.112. Regulated Contaminants and Physical Characteristics Control.

(a) Each quarter, as specified in the GRRP's Operation Optimization Plan, a project sponsor shall collect samples (grab or 24-hour composite) representative of the applied recycled municipal wastewater and have the samples analyzed for:

(1) the inorganic chemicals in Table 64431-A, except for nitrogen compounds;

(2) the radionuclide chemicals in Tables 64442 and 64443;

(3) the organic chemicals in Table 64444-A;

(4) the disinfection byproducts in Table 64533-A; and

(5) lead and copper.

(b) Recharge water (including recharge water after surface application) may be monitored in lieu of recycled municipal wastewater to satisfy the monitoring requirements in subsection (a)(4) if the fraction of recycled municipal wastewater in the recharge water is equal to or greater than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter. If the fraction of recycled municipal wastewater in the recharge water being monitored is less than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter, the reported value shall be adjusted to exclude the effects of dilution.

(c) Each year, the GRRP's project sponsor shall collect at least one representative sample (grab or 24-hour composite) of the recycled municipal wastewater or recharge water and have the sample(s) analyzed for the secondary drinking water contaminants in Tables 64449-A and 64449-B.

(d) If a result of the monitoring performed pursuant to subsection (a) exceeds a contaminant's MCL or action level (for lead and copper), a project sponsor shall collect another sample within 72 hours of notification of the result and then have it analyzed for the contaminant as confirmation.

(1) For a contaminant whose compliance with its MCL or action level is not based on a running annual average, if the average of the initial and confirmation sample exceeds the contaminant's MCL or action level, or the confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP's project sponsor shall notify the Department and Regional Board within 24 hours and initiate weekly monitoring until four consecutive weekly results are below the contaminant's MCL or action level. If the running four-week average exceeds the contaminant's MCL or action level, the GRRP's project sponsor shall notify the Department and Regional Board within 24 hours and, if directed by the Department or Regional Board, suspend application of the recycled municipal wastewater.

(2) For a contaminant whose compliance with its MCL is based on a running annual average, if the average of the initial and confirmation sample exceeds the contaminant's MCL, or a confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP shall initiate weekly monitoring for the contaminant until the running four-week average no longer exceeds the contaminant's MCL.

(A) If the running four-week average exceeds the contaminant's MCL, a project sponsor shall describe the reason(s) for the exceedance and provide a schedule for completion of corrective actions in a report submitted to the Department and Regional Board no later than 45 days following the quarter in which the exceedance occurred.

(B) If the running four-week average exceeds the contaminant's MCL for sixteen consecutive weeks, a project sponsor shall notify the Department and Regional Board within 48 hours of knowledge of the exceedance and, if directed by the Department or Regional Board, suspend application of the recycled municipal wastewater.

(e) If the annual average of the results of the monitoring performed pursuant to subsection (c) exceeds a contaminant's secondary MCL in Table 64449-A or the upper limit in Table 64449-B, a project sponsor shall initiate quarterly monitoring of the recycled municipal wastewater for the contaminant and, if the running annual average of quarterly-averaged results exceeds a contaminant's secondary MCL or upper limit, describe the reason(s) for the exceedance and any corrective actions taken in a report submitted to Regional Board no later than 45 days following the quarter in which the exceedance occurred, with a copy concurrently provided to the Department. The annual monitoring in subsection (c) may resume if the running annual average of quarterly results does not exceed a contaminant's secondary MCL or upper limit.

(f) If four consecutive quarterly results for asbestos are below the detection limit in Table 64432-A for asbestos, monitoring for asbestos may be reduced to one sample every three years. Quarterly monitoring shall resume if asbestos is detected.

§60320.114. Diluent Water Requirements.

To be credited with diluent water used in calculating an RWC pursuant to section 60320.116, the GRRP shall comply with the requirements of this section and receive Department approval. For diluent water that is a Department-approved drinking water source, the GRRP's project sponsor is exempt from subsections (a) and (b). The GRRP's project sponsor shall:

(a) Monitor the diluent water quarterly for nitrate and nitrite and, within 72 hours of being informed by the laboratory of a nitrate, nitrite, or nitrate plus nitrite result exceeding a maximum contaminant level (MCL), collect a confirmation sample. If the average of the two samples is greater than an MCL;

(1) notify the Department and the Regional Board within 48 hours of receiving the confirmation sample result,

(2) investigate the cause(s) and implement corrective actions, and

(3) each week, collect and analyze two grab samples at least three days apart as specified in the GRRP's Operation Optimization Plan. If the average of the results for a two-week period exceeds the MCL, surface application of the diluent water shall not be used in the calculation of RWC until corrective actions are made. Quarterly monitoring may resume if four consecutive results are below the MCL.

(b) Conduct a source water evaluation per the California-Nevada Section of American Water Works Association's Watershed Sanitary Survey Guidance Manual (1993), as it may be amended, or other Department-approved evaluation, of the diluent water for Department review and approval that includes, but is not limited to:

(1) a description of the source of the diluent water;

(2) delineation of the origin and extent of the diluent water;

(3) the susceptibility of the diluent water to contamination;

(4) the identification of known or potential contaminants; and

(5) an inventory of the potential sources of diluent water contamination.

(c) Ensure diluent water does not exceed a primary MCL, a secondary MCL upper limit (if not historically used to recharge the basin), or a notification level (NL), and implement a Department-approved water quality monitoring plan for Department-specified contaminants to demonstrate compliance with the primary MCLs, secondary MCLs (except turbidity, color, and odor), and NLs. The plan shall also include:

(1) except for Department-approved drinking water sources used as a diluent water, monitoring of any chemicals or contaminants required pursuant to section 60320.120, based on the source water evaluation performed in subsection (b); and

(2) actions to be taken in the event of non-compliance with a primary MCL, secondary MCL, or exceedance of a NL.

(d) Develop a method for determining the volume of diluent water to be credited and demonstrate that the diluent water will be introduced in a manner such that the diluent water volume will not result in the GRRP's 120-month running monthly average RWC exceeding its maximum RWC at or beyond the boundary established pursuant to section 60320.100(e)(2). The method shall be submitted to the Department for review and approval, and be conducted at a frequency specified in the engineering report prepared pursuant to section 60323. The method shall address all conditions that influence how and when the recycled municipal wastewater and diluent water arrive at all points along the boundary. The conditions must include, but are not limited to, temporal variability in the diluent water supply and regional groundwater gradients, the difference in the distribution of the recycled municipal wastewater and diluent water between individual aquifers where more than one aquifer is replenished, and the difference in travel-time when recycled municipal wastewater and diluent water are introduced at different locations and/or times.

(e) For credit prior to the operation of the GRRP, but not to exceed 120 months:

(1) demonstrate that the diluent water met the nitrate, nitrite, and nitrate plus nitrite MCLs, NLs, and the water quality requirements in section 60320.112;

(2) provide evidence that the quantity of diluent water has been accurately determined and was distributed such that the proposed or permitted maximum RWC would not have been exceeded; and

(3) conduct a source water evaluation of the diluent water pursuant to subsection (b).

(f) In the Operation Optimization Plan prepared pursuant to section 60320.122, include a description of:

(1) how the diluent water will be distributed in a manner that ensures that the maximum RWC will not be exceeded during normal operations; and

(2) the actions to be taken in the event the diluent water is curtailed or is no longer available.

(g) If approved by the Department, recharge water may be monitored in lieu of a diluent water source if the diluent water source cannot be monitored directly in a manner that provides samples representative of the diluent water being applied.

§60320.116. Recycled Municipal Wastewater Contribution (RWC) Requirements.

(a) Each month, for each surface application GRRP used for replenishing a groundwater basin, the GRRP's project sponsor shall calculate the running monthly average (RMA) RWC based on the total volume of the recycled municipal wastewater and credited diluent water for the preceding 120 months. For GRRPs in operation less than 120 months, calculation of the RMA RWC shall commence after 30 months of recycled municipal wastewater application, based on the total volume of the recycled municipal wastewater and credited diluent water introduced during the preceding months.

(b) The GRRP's RMA RWC, as determined in subsection (a), shall not exceed the maximum RWC specified for the GRRP by the Department.

(c) The initial maximum RWC shall not exceed 0.20 or an alternative initial RWC approved by the Department. An alternative initial RWC up to 1.0 may be approved by the Department based on, but not limited to, the Department's review of the engineering report, the information obtained as a result of the public hearing(s), and a project sponsor's demonstration that the treatment processes preceding the soil-aquifer treatment process will reliably achieve total organic carbon (TOC) concentrations no greater than 0.5 mg/L divided by the proposed initial RWC.

(d) A GRRP may increase its maximum RWC, provided:

(1) the increase has been approved by the Department and Regional Board;

(2) for the previous 52 weeks, the TOC 20-week running average, as monitored pursuant to section 62320.118, has not exceeded 0.5 mg/L divided by the proposed maximum RWC; and

(3) the GRRP has received a permit from the Regional Board that allows operation of the GRRP at the increased maximum RWC.

(e) In addition to the requirements in subsection (d), prior to operating a GRRP at an RWC greater than 0.50 or 0.75, which must be achieved sequentially, a project sponsor shall:

(1) provide a proposal to the Department prepared and signed by an engineer licensed in California with at least three years of experience in wastewater treatment and public water supply;

(2) submit an updated engineering report and Operation Optimization Plan; and

(3) provide evidence of compliance with section 60320.126(a).

(f) If the RMA RWC exceeds its maximum RWC, the GRRP's project sponsor shall:

(1) notify the Department and Regional Board in writing within seven days of knowledge of the exceedance; and

(2) within 60 days of knowledge of the exceedance, implement corrective action(s) and additional actions that may be required by the Department or Regional Board, and submit a report to the Department and Regional Board describing the reason(s) for the exceedance and the corrective action(s) taken to avoid future exceedances.

§60320.118. Total Organic Carbon (TOC) and Soil-Aquifer Treatment (SAT) Process Requirements.

For each surface application GRRP used for replenishing a groundwater basin, the GRRP's project sponsor shall assess the SAT process through the monitoring of TOC, indicator compounds, and surrogate parameters, as approved by the Department.

(a) At least once each week, a project sponsor shall analyze TOC from representative 24-hour composite samples of the following:

(1) the undiluted recycled municipal wastewater, prior to application or within the zone of percolation;

(2) the diluted percolated recycled municipal wastewater, with the value amended to negate the effect of the diluent water; or

(3) the undiluted recycled municipal wastewater prior to application, with the value amended using a soil-aquifer treatment factor approved by the Department and based on demonstration studies, which reliably predicts the removal efficiency of the process.

(b) Grab samples may be used in lieu of the 24-hour composite samples required in subsection (a) if:

(1) the GRRP demonstrates that a grab sample is representative of the water quality throughout a 24-hour period; or

(2) the entire recycled municipal wastewater stream has been treated by reverse osmosis meeting the criteria in sections 60320.201(a) and (b).

(c) Analytical results of the TOC monitoring performed pursuant to subsection (a) shall not exceed 0.5 mg/L divided by the RMA RWC based on:

(1) the 20-week running average of all TOC results; and

(2) the average of the last four TOC results.

(d) If the GRRP exceeds the limit in subsection (c)(1) or its approved increased TOC limit obtained pursuant to section 60320.130(c), based on a 20-week running average, a project sponsor shall take the following actions upon being notified of the results:

(1) immediately suspend the addition of recycled municipal wastewater until at least two consecutive results, three days apart, are less than the limit;

(2) notify the Department and Regional Board within seven days of suspension; and

(3) within 60 days, submit a report to the Department and Regional Board describing the reasons for the exceedance and the corrective actions to avoid future exceedances. At a minimum, the corrective actions shall include;

(A) a reduction of RWC sufficient to comply with the limit, and/or

(B) additional treatment demonstrated to the Department to remove TOC and chemicals or contaminants of concern to public health.

(e) If the GRRP exceeds the limit in subsection (c)(2) or its approved increased TOC limit obtained pursuant to section 60320.130(c), based on the average of the last four results, a project sponsor shall, within 60 days of being notified of the results, submit a report to the Department and Regional Board describing the reasons for the exceedance and the corrective actions taken to avoid future exceedances.

(f) Prior to a GRRP beginning initial operation and at five-year intervals thereafter, a project sponsor shall conduct a study to determine the occurrence of indicator compounds in the recycled municipal wastewater to be applied at the GRRP. Following completion of the study, a project sponsor shall propose at least three indicator compounds for use in meeting subsection (g). The protocol for the occurrence study, the study's results, and the indicator compounds to be used shall be reviewed and approved by the Department.

(g) Quarterly, a project sponsor shall monitor the GRRP's recycled municipal wastewater or recharge water prior to the SAT process and the water after the SAT process, but at a point no farther than 30 days downgradient of the spreading area. The monitoring shall include at least three indicator compounds based on the results of an occurrence study approved by the Department. If the monitoring results do not indicate a reduction of at least 90 percent in the concentration of indicator compounds by the SAT, excluding the effects of dilution from diluent water that may be present, a project sponsor shall investigate the reason for the low reduction and report the indicator compound and investigative results within 90 days of receipt of the analytical results.

(h) If the result of the investigation in subsection (g) concludes that the 90 percent reduction could not be demonstrated because the concentration of indicator compounds prior to the SAT process was not sufficient, a project sponsor shall consult with the Department and comply with an alternative monitoring plan approved by the Department. If a project sponsor demonstrates that there are not three compounds available and suitable for indicating a 90 percent reduction pursuant to subsection (g), a project sponsor may utilize an indicator compound that achieves a reduction less than 90 percent, with Department approval of the alternative indicator compound and reduction criteria.

(i) To use one or more wastewater chemicals in lieu of TOC, a project sponsor shall obtain approval from the Department. At a minimum, the chemical(s) used in lieu of TOC shall:

(1) be quantifiable in the wastewater, recycled municipal wastewater, groundwater, and throughout the treatment processes; and

(2) have identifiable treatment performance standards as protective of public health as the TOC standards in this Article.

§60320.120. Additional Chemical and Contaminant Monitoring.

(a) Each quarter, the GRRP's project sponsor shall sample and analyze the recycled municipal wastewater and the groundwater (from the downgradient monitoring wells established pursuant to section 60320.126) for the following:

(1) Priority Toxic Pollutants (chemicals listed in 40 CFR section 131.38, "Establishment of numeric criteria for priority toxic pollutants for the State of California," as the foregoing may be amended) specified by the Department, based on the Department's review of the GRRP's engineering report; and

(2) Chemicals that the Department has specified, based on a review of the GRRP's engineering report, the affected groundwater basin(s), and the results of the assessment performed pursuant to section 60320.106(b)(1).

(b) Each quarter, the GRRP's project sponsor shall sample and analyze the recycled municipal wastewater for Department-specified chemicals having notification levels (NLs). Recharge water (including recharge water after surface application) may be monitored in lieu of recycled municipal wastewater if the fraction of recycled municipal wastewater in the recharge water is equal to or greater than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter. If the fraction of recycled municipal wastewater in the recharge water being monitored is less than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter, the reported value shall be adjusted to exclude the effects of dilution. If a result exceeds a NL, within 72 hours of notification of the result a project sponsor shall collect another sample and have it analyzed for the contaminant as confirmation. If the average of the initial and confirmation sample exceeds the contaminant's NL, or a confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP shall initiate weekly monitoring for the contaminant until the running four-week average no longer exceeds the NL.

(1) If the running four-week average exceeds the contaminant's NL, a project sponsor shall describe the reason(s) for the exceedance and provide a schedule for completion of corrective actions in a report submitted to the Regional Board no later than 45 days following the quarter in which the exceedance occurred, with a copy concurrently provided to the Department.

(2) If the running four-week average exceeds the contaminant's NL for sixteen consecutive weeks, a project sponsor shall notify the Department and Regional Board within 48 hours of knowledge of the exceedance.

(c) A project sponsor may reduce monitoring for the chemicals in this section to once each year following Department approval based on the Department's review of the most recent two years of results of the monitoring performed pursuant to this section.

(d) Annually, a project sponsor shall monitor the recycled municipal wastewater for indicator compounds specified by the Department and Regional Board based on the following:

(1) a review of the GRRP's engineering report;

(2) the inventory developed pursuant to section 60320.106(b)(4);

(3) the affected groundwater basin(s);

(4) an indicator compound's ability to characterize the presence of pharmaceuticals, endocrine disrupting chemicals, personal care products, and other indicators of the presence of municipal wastewater; and

(5) the availability of a test method for a chemical.

(e) A chemical or contaminant detected as a result of monitoring conducted pursuant to this section shall be reported to the Department and Regional Board no later than the quarter following the quarter in which the results are received by the GRRP's project sponsor.

§60320.122. Operation Optimization and Plan.

(a) Prior to operation of a GRRP, a project sponsor shall submit an Operation Optimization Plan to the Department and Regional Board for review and approval. At a minimum, the Operation Optimization Plan shall identify and describe the operations, maintenance, analytical methods, monitoring necessary for the GRRP to meet the requirements of this Article, and the reporting of monitoring results to the Department and Regional Board. A project sponsor shall be responsible for ensuring that the Operation Optimization Plan is, at all times, representative of the current operations, maintenance, and monitoring of the GRRP. A GRRP's project sponsor shall make the Operation Optimization Plan available to the Department or Regional Board for review upon request.

(b) During the first year of operation of a GRRP and at all times thereafter, all treatment processes shall be operated in a manner providing optimal reduction of all chemicals and contaminants including:

(1) microbial contaminants;

(2) regulated contaminants identified in section 60320.112 and the nitrogen compounds required pursuant to section 60320.110; and

(3) chemicals and contaminants required pursuant to section 60320.120.

(c) Within six months of optimizing treatment processes pursuant to subsection (b) and anytime thereafter operations are optimized that result in a change in operation, a project sponsor shall update the GRRP's Operation Optimization Plan to include such changes in operational procedures and submit the operations plan to the Department for review.

§60320.124. Response Retention Time.

(a) The recycled municipal wastewater applied by a GRRP shall be retained underground for a period of time necessary to allow a project sponsor sufficient response time to identify treatment failures and implement actions, including those required pursuant to section 60320.100(b), necessary for the protection of public health.

(b) The response retention time required in subsection (a) must be approved by the Department, based on information provided in the engineering report required pursuant to section 60323. The response retention time shall be no less than two months.

(c) To demonstrate the retention time underground is no less than the response retention time approved pursuant to subsection (b), a tracer study utilizing an added tracer shall be implemented under hydraulic conditions representative of normal GRRP operations. With Department approval, an intrinsic tracer may be used in lieu of an added tracer. For each month of retention time estimated utilizing the approved intrinsic tracer, a project sponsor shall receive no more than 0.67 months credit. The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reaches the monitoring point. A project sponsor for a GRRP shall initiate the tracer study prior to the end of the third month of operation. A project sponsor for a GRRP permitted on or before June 18, 2014, that has not performed a tracer study shall complete a tracer study demonstrating the retention time underground.

(d) For the purpose of siting a GRRP location during project planning and until a GRRP's project sponsor has met the requirements of subsection (c), for each month of retention time estimated using the method in column 1, the recycled municipal wastewater or recharge water may be credited with no more than the corresponding response time in column 2 of Table 60320.124.

Table 60320.124

Column 1	**Column 2**
Method used to estimate the retention time	**Response Time Credit per Month**
Tracer study utilizing an added tracer.[1]	1.0 month
Tracer study utilizing an intrinsic tracer.[1]	0.67 month
Numerical modeling consisting of calibrated finite element or finite difference models using validated and verified computer codes used for simulating groundwater flow.	0.50 month
Analytical modeling using existing academically-accepted equations such as Darcy's Law to estimate groundwater flow conditions based on simplifying aquifer assumptions.	0.25 month

[1] The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reaches the monitoring point.

(e) A project sponsor shall obtain Department approval for the protocol(s) to be used to establish the retention times in subsections (c) and (d).

(f) Upon request from the Department, a project sponsor shall demonstrate that the underground retention times required in this section are being met based on changes in hydrogeological or climatic conditions since the most recent demonstration.

§60320.126. Monitoring Well Requirements.

(a) Prior to operating a GRRP, a project sponsor shall site and construct at least two monitoring wells downgradient of the GRRP such that:

(1) at least one monitoring well is located;

(A) no less than two weeks but no more than six months of travel through the saturated zone affected by the GRRP, and

(B) at least 30 days upgradient of the nearest drinking water well;

(2) in addition to the well(s) in paragraph (1) and after consultation with the Department, at least one monitoring well is located between the GRRP and the nearest downgradient drinking water well; and

(3) samples from the monitoring wells in paragraphs (1) and (2) can be;

(A) obtained independently from each aquifer, initially receiving the water used as a source of drinking water supply, that will receive the GRRP's recharge water, and

(B) validated as receiving recharge water from the GRRP.

(b) In addition to the monitoring required pursuant to section 60320.120, from each monitoring well in subsection (a)(1), and each monitoring well in subsection (a)(2) that has recharge water located within one year travel time of the well(s), a project sponsor shall collect two samples prior to GRRP operation and at least one sample each quarter after operation begins. Each sample shall be analyzed for total nitrogen, nitrate, nitrite, the contaminants in Tables 64449-A and B of section 64449, and any contaminants and chemicals specified by the Department or Regional Board based on the results of the recycled municipal wastewater monitoring conducted pursuant to this Article.

(c) If a result from the monitoring conducted pursuant to subsection (b) exceeds 80 percent of a nitrate, nitrite, or nitrate plus nitrite MCL a project sponsor shall, within 48 hours of being notified of the result by the laboratory, collect another sample and have it analyzed for the contaminant. If the average of the result of the initial sample and the confirmation sample exceed the contaminant's MCL, a project sponsor shall:

(1) within 24 hours of being notified by the laboratory of the confirmation sample result, notify the Department and Regional Board; and

(2) discontinue surface application of recycled municipal wastewater until corrective actions have been taken or evidence is provided to the Department and Regional Board that the contamination was not a result of the GRRP.

(d) For Department-specified chemical analyses completed in a month, a project sponsor shall ensure the laboratory electronically submits results to the Department no later than 45 days after the end of the month in which monitoring occurred, in a manner such that data is readily uploaded into the Department's database. Utilization of the process described on the Department's Web site will satisfy this requirement.

(e) The GRRP's project sponsor may reduce monitoring for the chemicals and contaminants in subsection (b) to once each year following Department approval based on the Department's review of the most recent two years of monitoring results.

§60320.128. Reporting.

(a) No later than six months after the end of each calendar year, a project sponsor shall provide a report to the Department and Regional Board. Public water systems and drinking water well owners having downgradient sources potentially affected by the GRRP and within 10 years groundwater travel time from the GRRP shall be notified by direct mail and/or electronic mail of the availability of the report. The report shall be prepared by an engineer licensed in California and experienced in the fields of wastewater treatment and public water supply. The report shall include the following:

(1) A summary of the GRRP's compliance status with the monitoring requirements and criteria of this Article during the previous calendar year;

(2) For any violations of this Article during the previous calendar year;

(A) the date, duration, and nature of the violation,

(B) a summary of any corrective actions and/or suspensions of surface application of recycled municipal wastewater resulting from a violation, and

(C) if uncorrected, a schedule for and summary of all remedial actions;

(3) Any detections of monitored chemicals or contaminants, and any observed trends in the monitoring wells and diluent water supplies;

(4) Information pertaining to the vertical and horizontal migration of the recharge water plume;

(5) A description of any changes in the operation of any unit processes or facilities;

(6) A description of any anticipated changes, along with an evaluation of the expected impact of the changes on subsequent unit processes;

(7) The estimated quantity and quality of the recycled municipal wastewater and diluent water to be applied for the next calendar year;

(8) A summary of the measures taken to comply with section 60320.106 and 60320.100(j), and the effectiveness of the implementation of the measures; and

(9) Increases in RWC during the previous calendar year and RWC increases anticipated for the next calendar year.

(b) Every five years from the date of the initial approval of the engineering report required pursuant to section 60323, a project sponsor shall update the report to address any project changes and submit the report to the Department and Regional Board. The update shall include, but not be limited to:

(1) anticipated RWC increases, a description of how the RWC requirements in section 60320.116 will be met, and the expected impact the increase will have on the GRRP's ability to meet the requirements of this Article;

(2) evidence that the requirements associated with retention time in section 60320.108, if applicable, and section 60320.124 have been met; and

(3) a description of any inconsistencies between previous groundwater model predictions and the observed and/or measured values, as well as a description of how subsequent predictions will be accurately determined.

§60320.130. Alternatives.

(a) A project sponsor may use an alternative to a requirement in this Article if the GRRP's project sponsor:

(1) demonstrates to the Department that the proposed alternative assures at least the same level of protection to public health;

(2) receives written approval from the Department prior to implementation of the alternative; and

(3) if required by the Department or Regional Board, conducts a public hearing on the proposed alternative, disseminates information to the public, and receives public comments, pursuant to sections 60320.102(b) and (c).

(b) Unless specified otherwise by the Department, the demonstration in subsection (a)(1) shall include the results of a review of the proposed alternative by an independent scientific advisory panel that includes a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years of experience in wastewater treatment and public drinking water supply, a microbiologist, and a chemist.

(c) The TOC limit specified in section 60320.118(c) may be increased if:

(1) The increased TOC limit is approved by the Department and Regional Board;

(2) The GRRP has been in operation for the most recent ten consecutive years;

(3) A project sponsor submits a proposal to the Department prepared and signed by an engineer licensed in California with at least three years of experience in the fields of wastewater treatment and public water supply. The proposal shall include the following, based on the most recent ten consecutive years of operation;

(A) GRRP operations, monitoring, and compliance data,

(B) Evidence that the GRRP has a history of compliance with the requirements of their Regional Board permit,

(C) Evidence that the water collected at all downgradient drinking water wells and monitoring wells impacted by the GRRP has met the primary drinking water standards,

(D) Analytical or treatment studies requested by the Department to make the determination in subparagraph (C),

(E) Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.126(a), and

(F) A study defining the water quality changes, including organic carbon characterization, as a result of the impact of the GRRP; and

(4) A project sponsor performs a health effects evaluation that assesses the health risks to consumers of water impacted by the GRRP, including any anticipated water quality changes resulting from the proposed increased TOC limit. The evaluation shall include the following;

(A) An exposure assessment that characterizes the quality of the water consumed and the quantity of contaminants and chemicals consumed,

(B) All available human epidemiologic studies of the population that has consumed water impacted by the GRRP,

(C) The results of laboratory animal studies and health risk assessments available in peer-reviewed literature pertaining to water impacted by the GRRP and anticipated water quality changes resulting from the proposed increased TOC, including studies or assessments where extrapolation of data may be relevant,

(D) A health risk assessment of the potential individual and cumulative effects of each of the regulated contaminants identified in section 62320.112, and the chemicals or contaminants monitored pursuant to sections 60320.120(a) and (c), that includes;

1. lifetime risks of cancer, and
2. risks of non-cancer effects, and

(E) A report detailing comments, questions, concerns, and conclusions of a review by an independent scientific peer review advisory panel that includes, as a minimum, a toxicologist, an epidemiologist, an engineering geologist or hydrogeologist registered in California, an engineer licensed in California with at least three years of experience in wastewater treatment and public water supply, a microbiologist, and a chemist.

Article 5.2. Indirect Potable Reuse: Groundwater Replenishment – Subsurface Application.

§60320.200. General Requirements.

(a) The requirements of this Article apply to Groundwater Replenishment Reuse Projects (GRRPs) utilizing subsurface application, which receive initial permits from the Regional Board after June 18, 2014. Within 12 months after June 18, 2014, a project sponsor for a GRRP permitted on or before June 18, 2014, shall submit a report to the Department and appropriate Regional Board assessing its compliance with the requirements of this Article. For each requirement considered noncompliant and applicable by the Department or Regional Board, a project sponsor shall submit a schedule to the Department and Regional Board, for demonstrating and/or achieving compliance with the applicable requirements of this Article. Unless directed otherwise by the Department, a project sponsor's report for a GRRP permitted on or before June 18, 2014, need not assess compliance with requirements of this Article that are required to be met prior to operation of a GRRP, except subsection (b) of this section. The report is subject to review and approval by the Department and Regional Board. A project sponsor shall ensure the GRRP continuously treats, with full advanced treatment meeting the criteria in section 60320.201, the entire recycled municipal wastewater stream prior to application.

(b) Prior to operation of a GRRP, the GRRP's project sponsor shall obtain Department approval of a plan describing the steps a project sponsor will take to provide an alternative source of drinking water supply to all users of a producing drinking water well, or a Department-approved treatment mechanism a project sponsor will provide to all owners of a producing drinking water well, that as a result of the GRRP's operation, as determined by the Department:

(1) violates a California or federal drinking water standard;

(2) has been degraded to the degree that it is no longer a safe source of drinking water; or

(3) receives water that fails to meet section 60320.208.

(c) Prior to operating a GRRP, a project sponsor shall collect at least four samples, at least one sample each quarter, from each potentially affected aquifer. The samples shall be representative of water in each aquifer, taking into consideration seasonal variations, and be analyzed for the chemicals, contaminants, and characteristics pursuant to sections 60320.210, 60320.212, 60320.218, and 60320.220.

(d) A GRRP's recycled municipal wastewater shall be retained underground for a period of time no less than the retention time required pursuant to sections 60320.208 and 60320.224. The GRRP shall be designed and operated in a manner that ensures water treated pursuant to this Article, beyond the boundary described in subsection (e)(2), meets the recycled municipal wastewater contributions (RWC) requirements in section 60320.216.

(e) Based on hydrogeologic flowpaths, a GRRP's project sponsor shall provide the Department, Regional Board, and local well-permitting authorities a map of the GRRP site at a scale of 1:24,000 or larger (1 inch equals 2,000 feet or 1 inch equals less than 2,000 feet) or, if necessary, a site sketch at a scale providing more detail, that clearly indicates the criteria in paragraphs (1) – (4) below. A revised map shall be prepared and provided when conditions change such that the previous map no longer accurately reflects current conditions.

(1) the location and boundaries of the GRRP;

(2) a boundary representing a zone of controlled drinking water well construction, the greatest of the horizontal and vertical distances reflecting the retention times required pursuant to sections 60320.208 and 60320.224;

(3) a secondary boundary representing a zone of potential controlled drinking water well construction, depicting the zone within which a well would extend the

boundary in paragraph (2) to include existing or potential future drinking water wells, thereby requiring further study and potential mitigating activities prior to drinking water well construction; and

(4) the location of all monitoring wells established pursuant to section 60320.226, and drinking water wells within two years travel time of the GRRP based on groundwater flow directions and velocities expected under GRRP operating conditions.

(f) Prior to operating a GRRP, a project sponsor shall demonstrate to the Department and Regional Board that a project sponsor possesses adequate managerial and technical capability to assure compliance with this Article.

(g) Prior to replenishing a groundwater basin or an aquifer with recycled municipal wastewater, a GRRP's project sponsor shall demonstrate that all treatment processes have been installed and can be operated by a project sponsor to achieve their intended function. A protocol describing the actions to be taken to meet this subsection shall be included in the engineering report submitted pursuant section 60323.

(h) In the engineering report required pursuant to section 60323, a project sponsor for a GRRP shall include a hydrogeological assessment of the proposed GRRP's setting. The assessment shall include the following:

(1) the qualifications of the individual(s) preparing the assessment;

(2) a general description of geologic and hydrogeological setting of the groundwater basin(s) potentially directly impacted by the GRRP;

(3) a detailed description of the stratigraphy beneath the GRRP, including the composition, extent, and physical properties of the affected aquifers; and

(4) based on at least four rounds of consecutive quarterly monitoring to capture seasonal impacts;

(A) the existing hydrogeology and the hydrogeology anticipated as a result of the operation of the GRRP, and

(B) maps showing quarterly groundwater elevation contours, along with vector flow directions and calculated hydraulic gradients.

(i) If a project sponsor fails to complete compliance monitoring required pursuant to this Article, the Regional Board may determine water quality-related compliance based on available data.

(j) A project sponsor shall ensure that the recycled municipal wastewater used for a GRRP shall be from a wastewater management agency that is not in violation of the effluent limits pertaining to groundwater replenishment pursuant to this Article, as established in the wastewater management agency's Regional Board permit.

(k) If a project sponsor has been directed by the Department or Regional Board to suspend subsurface application pursuant to this Article, subsurface application shall not resume until the project sponsor has obtained Department and Regional Board approval.

§60320.201. Advanced Treatment Criteria.

Full advanced treatment is the treatment of an oxidized wastewater, as defined in section 60301.650, using a reverse osmosis and an oxidation treatment process that, at a minimum, meets the criteria of this section.

(a) A project sponsor shall select for use a reverse osmosis membrane such that:

(1) each membrane element used in the project has achieved a minimum rejection of sodium chloride of no less than 99.0 percent (99.0%) and an average (nominal) rejection of sodium chloride of no less than 99.2 percent (99.2%), as demonstrated through Method A of ASTM International's method D4194-03 (2008) using the following substitute test conditions:

(A) tests are operated at a recovery of no less than 15 percent (15%);

(B) sodium chloride rejection is based on three or more successive measurements, after flushing and following at least 30 minutes of operation having demonstrated that rejection has stabilized;

(C) an influent pH no less than 6.5 and no greater than 8.0; and

(D) an influent sodium chloride concentration of no greater than 2,000 mg/L, to be verified prior to the start of testing; and

(2) during the first twenty weeks of full-scale operation the membrane produces a permeate with no more than five percent (5%) of the sample results having TOC concentrations greater than 0.25 mg/L, as verified through monitoring no less frequent than weekly.

(b) For the reverse osmosis treatment process, a project sponsor shall propose, for Department review and approval, on-going performance monitoring (e.g., conductivity or TOC) that indicates when the integrity of the process has been compromised. The proposal shall include at least one form of continuous monitoring, as well as the associated surrogate and/or operational parameter limits and alarm settings that indicate when the integrity has been compromised.

(c) To demonstrate a sufficient oxidation process has been designed for implementation, a project sponsor shall:

(1) Perform an occurrence study on the project's municipal wastewater to identify indicator compounds and select a total of at least nine indicator compounds, with at least one from each of the functional groups in subparagraphs (A) through (I) below. A project sponsor shall submit an occurrence study protocol, as well as the subsequent results and chosen indicator compounds, to the Department for review and approval.

(A) Hydroxy Aromatic

(B) Amino/Acylamino Aromatic

(C) Nonaromatic with carbon double bonds
(D) Deprotonated Amine
(E) Alkoxy Polyaromatic
(F) Alkoxy Aromatic
(G) Alkyl Aromatic
(H) Saturated Aliphatic
(I) Nitro Aromatic

(2) Utilize an oxidation process that achieves optimal removal of the indicator compounds selected in paragraph (1) such that removal is no less than;

(A) 0.5-log (69 percent) for each indicator compound representing the functional groups in paragraphs (1)(A) through (1)(G), and

(B) 0.3-log (50 percent) for each indicator compound representing the functional groups in paragraphs (1)(H) and (1)(I).

(3) Establish at least one surrogate or operational parameter that reflects the removal of at least five of the nine indicator compounds selected pursuant to paragraph (1) such that;

(A) at least one of the five indicator compounds represents at least one functional group in paragraphs (1)(A) through (1)(G),

(B) at least one of the five indicator compounds represents at least one functional group in paragraphs (1)(H) or (1)(I),

(C) at least one surrogate or operational parameter is capable of being monitored continuously, recorded, and have associated alarms, and

(D) a surrogate or operational parameter, including the parameter in subparagraph (C), is identified that indicates when the process may no longer meet the criteria established in paragraph (2).

(4) Conduct testing that includes confirmation of the findings of the occurrence study in paragraph (1) and provides evidence that the requirements of paragraphs (2) and (3) can be met with a full-scale oxidation process. The testing shall include challenge or spiking tests conducted to determine the removal differential under normal operating conditions utilizing, at minimum, the nine indicator compounds identified in paragraph (1). A project sponsor shall submit a testing protocol, as well as the subsequent results, to the Department for review and approval.

(d) In lieu of demonstrating that a sufficient oxidation process has been designed for implementation pursuant to subsection (c), a project sponsor may conduct testing demonstrating that the oxidation process will provide no less than 0.5-log (69 percent) reduction of 1,4-dioxane.

(1) A project sponsor shall submit a testing protocol, as well as the subsequent results, to the Department for review and approval. The testing shall include challenge or spiking tests, using 1,4-dioxane, to demonstrate the proposed oxidation process will achieve the minimum 0.5-log reduction under the proposed oxidation process's normal full-scale operating conditions.

(2) A project sponsor shall establish surrogate and/or operational parameters that reflect whether the minimum 0.5-log 1,4-dioxane reduction design criteria is being met. At least one surrogate or operational parameter shall be capable of being monitored continuously, recorded, and have associated alarms that indicate when the process is not operating as designed.

(e) During the full-scale operation of the oxidation process designed pursuant to subsection (c) or (d), a project sponsor shall continuously monitor the surrogate and/or operational parameters established pursuant to subsection (c)(3)(C) or (d)(2), as applicable. A project sponsor shall implement, in full-scale operation, the oxidation process as designed pursuant to subsection (c) or (d).

(f) Within 60 days after completing the initial 12-months of monitoring pursuant to subsection (e), a project sponsor shall submit a report to the Department and Regional Board that includes:

(1) the results of the monitoring performed in subsection (e);

(2) the removal differential of the indicator compounds;

(3) a description of the efficacy of the surrogate and/or operational parameters to reflect the removal differential of the indicator compounds; and

(4) a description of actions taken, or to be taken, if the indicator compound removal did not meet the associated design criteria in subsection (c) or (d), the continuous surrogate and/or operational parameter monitoring in subsection (c)(3)(C) or (d)(2) fails to correspond to the differential indicator compound removal, or the surrogate and/or operational parameter established in subsection (c)(3)(D) or (d)(2) is not met.

(g) Within 60 days after completing the initial 12 months of operation of the reverse osmosis process, a project sponsor shall submit a report to the Department and Regional Board describing the effectiveness of the treatment, process failures, and actions taken in the event the on-going monitoring in subsection (b) indicated that process integrity was compromised.

(h) Each quarter, a project sponsor shall calculate what percent of results of the quarter's monitoring, conducted pursuant to subsections (b) and (e), did not meet the surrogate and/or operational parameter limits established to assure proper on-going performance of the reverse osmosis and oxidation processes. If the percent is greater than ten, within 45 days after the end of the quarter a project sponsor shall:

(1) submit a report to the Department and Regional Board describing the corrective actions planned or taken to reduce the percent to ten percent (10%) or less; and

(2) consult with the Department and, if required, comply with an alternative monitoring plan approved by the Department.

(i) Each month a project sponsor shall collect samples (grab or composite) representative of the effluent of the advanced treatment process and have the samples analyzed for contaminants having MCLs and notification levels (NLs). After 12 consecutive months with no results exceeding an MCL or NL, a project sponsor may apply for a reduced monitoring frequency. The reduced monitoring frequency shall be no less than quarterly. Monitoring conducted pursuant to this subsection may be used in lieu of the monitoring (for the same contaminants) required pursuant to sections 60320.212 and 60320.220. The effluent of the advanced treatment process shall not exceed an MCL.

§60320.202. Public Hearing.

(a) A public hearing for a GRRP shall be held by a project sponsor prior to the Department's submittal of its recommendations to the Regional Board for the GRRP's initial permit and any time an increase in maximum RWC has been proposed but not addressed in a prior public hearing. Prior to a public hearing conducted pursuant to this section, a project sponsor shall provide the Department, for its review and approval, the information a project sponsor intends to present at the hearing. Following the Department's approval of the information, a project sponsor shall place the information on a project sponsor's Web site and in a repository that provides at least 30 days of public access to the information prior to the public hearing.

(b) Prior to placing the information required pursuant to subsection (a) in a repository, a project sponsor shall:

(1) Notify the public of the following;

(A) the location and hours of operation of the repository,

(B) the Internet address where the information may be viewed,

(C) the purpose of the repository and public hearing,

(D) the manner in which the public can provide comments, and

(E) the date, time, and location of the public hearing; and

(2) At a minimum, notify the first downgradient drinking water well owner and well owners whose drinking water well is within 10 years from the GRRP based on groundwater flow directions and velocities.

(c) Unless directed otherwise by the Department, the public notification made pursuant to subsection (b)(2) shall be by direct mail and the notification made pursuant to subsection (b)(1) shall be delivered in a manner to reach persons whose source of drinking water may be impacted by the GRRP, using one or more of the following methods:

(1) local newspaper(s) publication of general circulation;

(2) mailed or direct delivery of a newsletter;

(3) conspicuously placed statement in water bills; and/or

(4) television and/or radio.

§60320.204. Lab Analyses.

(a) Analyses for contaminants having primary or secondary MCLs shall be performed by laboratories approved to perform such analyses by the Department utilizing Department-approved drinking water methods.

(b) Analyses for chemicals other than those having primary or secondary MCLs shall be described in the GRRP's Operation Optimization Plan prepared pursuant to section 60320.222.

§60320.206. Wastewater Source Control.

A project sponsor shall ensure that the recycled municipal wastewater used for a GRRP shall be from a wastewater management agency that:

(a) administers an industrial pretreatment and pollutant source control program; and

(b) implements and maintains a source control program that includes, at a minimum;

(1) an assessment of the fate of Department-specified and Regional Board-specified chemicals and contaminants through the wastewater and recycled municipal wastewater treatment systems,

(2) chemical and contaminant source investigations and monitoring that focuses on Department-specified and Regional Board-specified chemicals and contaminants,

(3) an outreach program to industrial, commercial, and residential communities within the portions of the sewage collection agency's service area that flows into the water reclamation plant subsequently supplying the GRRP, for the purpose of managing and minimizing the discharge of chemicals and contaminants at the source, and

(4) a current inventory of chemicals and contaminants identified pursuant to this section, including new chemicals and contaminants resulting from new sources or changes to existing sources, that may be discharged into the wastewater collection system.

§60320.208. Pathogenic Microorganism Control.

(a) A project sponsor shall design and operate a GRRP such that the recycled municipal wastewater used as recharge water for a GRRP receives treatment that achieves at least 12-log enteric virus reduction, 10-log Giardia cyst reduction, and 10-log Cryptosporidium oocyst reduction. The treatment train shall consist of at least three separate treatment processes. For each pathogen (i.e., virus, Giardia cyst, or Cryptosporidium oocyst), a separate treatment process may be credited with no more than 6-log reduction, with at least three processes each being credited with no less than 1.0-log reduction.

(b) For each month retained underground as demonstrated in subsection (e), the recycled municipal wastewater or recharge water will be credited with 1-log virus reduction.

(c) With the exception of log reduction credited pursuant to subsection (b), a project sponsor shall validate each of the treatment processes used to meet the requirements in subsection (a) for their log reduction by submitting a report for the Department's review and approval, or by using a challenge test approved by the Department, that provides evidence of the treatment process's ability to reliably and consistently achieve the log reduction. The report and/or challenge test shall be prepared by an engineer licensed in California with at least five years of experience, as a licensed engineer, in wastewater treatment and public water supply, including the evaluation of treatment processes for pathogen control. With the exception of retention time underground, a project sponsor shall propose and include in its Operation Optimization Plan prepared pursuant to section 60320.222, on-going monitoring using the pathogenic microorganism of concern or a microbial, chemical, or physical surrogate parameter(s) that verifies the performance of each treatment process's ability to achieve its credited log reduction.

(d) To demonstrate the retention time underground in subsection (b) a tracer study utilizing an added tracer shall be implemented under hydraulic conditions representative of normal GRRP operations. The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reached the monitoring point. A project sponsor for a GRRP shall initiate the tracer study prior to the end of the third month of operation. A project sponsor for a GRRP permitted on or before June 18, 2014, that has not already performed such a tracer study shall complete a tracer study demonstrating the retention time underground. With Department approval, an intrinsic tracer may be used in lieu of an added tracer, with no more credit provided than the corresponding virus log reduction in column 2 of Table 60320.208.

(e) For the purpose of siting a GRRP location during project planning and until a GRRP's project sponsor has met the requirements of subsection (d), for each month of retention time estimated using the method in column 1, the recycled municipal wastewater or recharge water shall be credited with no more than the corresponding virus log reduction in column 2 of Table 60320.208.

Table 60320.208

Column 1	**Column 2**
Method used to estimate the retention time to the nearest downgradient drinking water well	**Virus Log Reduction Credit per Month**
Tracer study utilizing an added tracer.[1]	1.0 log
Tracer study utilizing an intrinsic tracer.[1]	0.67 log
Numerical modeling consisting of calibrated finite element or finite difference models using validated and verified computer codes used for simulating groundwater flow.	0.50 log
Analytical modeling using existing academically-accepted equations such as Darcy's Law to estimate groundwater flow conditions based on simplifying aquifer assumptions.	0.25 log

[1] The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reached the monitoring point.

(f) A project sponsor shall obtain Department approval for the protocol(s) to be used to establish the retention times in subsections (d) and (e).

(g) Based on changes in hydrogeological or climatic conditions since the most recent demonstration, the Department may require a GRRP's project sponsor to demonstrate that the underground retention times required in this section are being met.

(h) If a pathogen reduction in subsection (a) is not met based on the on-going monitoring required pursuant to subsection (c), within 24 hours of being aware a project sponsor shall immediately investigate the cause and initiate corrective actions. The project sponsor shall immediately notify the Department and Regional Board if the GRRP fails to meet the pathogen reduction criteria longer than 4 consecutive hours, or more than a total of 8 hours during any 7-day period. Failures of shorter duration shall be reported to the Regional Board by a project sponsor no later than 10 days after the month in which the failure occurred.

(i) If the effectiveness of a treatment train's ability to reduce enteric virus is less than 10-logs, or Giardia cyst or Cryptosporidium oocyst reduction is less than 8-logs, a project sponsor shall immediately notify the Department and Regional Board, and discontinue application of recycled municipal wastewater at the GRRP, unless directed otherwise by the Department or Regional Board.

§60320.210. Nitrogen Compounds Control.

(a) To demonstrate control of the nitrogen compounds, a project sponsor shall:

(1) Each week, at least three days apart as specified in the GRRP's Operation Optimization Plan, collect at least two total nitrogen samples (grab or 24-hour composite) representative of the recycled municipal wastewater or recharge water applied. Samples may be collected before or after subsurface application;

(2) Have the samples collected pursuant to paragraph (1) analyzed for total nitrogen, with the laboratory being required by a project sponsor to complete each analysis within 72 hours and have the result reported to a project sponsor within the same 72 hours if the result of any single sample exceeds 10 mg/L;

(3) If the average of the results of two consecutive samples collected pursuant to paragraph (1) exceeds 10 mg/L total nitrogen;

(A) take a confirmation sample and notify the Department and the Regional Board within 48 hours of being notified of the results by the laboratory,

(B) investigate the cause for the exceedances and take actions to reduce the total nitrogen concentrations to ensure continued or future exceedances do not occur, and

(C) initiate additional monitoring for nitrogen compounds as described in the GRRP's Operation Optimization Plan, including locations in the groundwater basin, to identify elevated concentrations and determine whether such elevated concentrations exceed or may lead to an exceedance of a nitrogen-based MCL; and

(4) If the average of the results of four consecutive samples collected pursuant to paragraph (1) exceeds 10 mg/L total nitrogen, suspend the subsurface application of recycled municipal wastewater. Subsurface application shall not resume until corrective actions have been taken and at least two consecutive total nitrogen sampling results are less than 10 mg/L.

(b) Following Department and Regional Board approval, a project sponsor may initiate reduced monitoring frequencies for total nitrogen. A project sponsor may apply to the Department and Regional Board for reduced monitoring frequencies for total nitrogen if, for the most recent 12 months:

(1) the average of all results did not exceed 5 mg/L total nitrogen; and

(2) the average of a result and its confirmation sample (taken within 24 hours of receipt of the initial result) did not exceed 10 mg/L total nitrogen.

(c) If the results of reduced monitoring conducted as approved pursuant to subsection (b) exceed the total nitrogen concentration criteria in subsection (b), a project sponsor shall revert to the monitoring frequencies for total nitrogen prior to implementation of the reduced frequencies. Reduced frequency monitoring shall not resume unless the requirements of subsection (b) are met.

§60320.212. Regulated Contaminants and Physical Characteristics Control.

(a) Each quarter, as specified in the GRRP's Operation Optimization Plan, a project sponsor shall collect samples (grab or 24-hour composite) representative of the applied recycled municipal wastewater and have the samples analyzed for:

(1) the inorganic chemicals in Table 64431-A, except for nitrogen compounds;

(2) the radionuclide chemicals in Tables 64442 and 64443;

(3) the organic chemicals in Table 64444-A;

(4) the disinfection byproducts in Table 64533-A; and

(5) lead and copper.

(b) Recharge water may be monitored in lieu of recycled municipal wastewater to satisfy the monitoring requirements in subsection (a)(4) if the fraction of recycled municipal wastewater in the recharge water is equal to or greater than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter. If the fraction of recycled municipal wastewater in the recharge water being monitored is less than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter, the reported value shall be adjusted to exclude the effects of dilution.

(c) Each year, the GRRP's project sponsor shall collect at least one representative sample (grab or 24-hour composite) of the recycled municipal wastewater and have the sample(s) analyzed for the secondary drinking water contaminants in Tables 64449-A and 64449-B.

(d) If a result of the monitoring performed pursuant to subsection (a) exceeds a contaminant's MCL or action level (for lead and copper), a project sponsor shall collect another sample within 72 hours of notification of the result and then have it analyzed for the contaminant as confirmation.

(1) For a contaminant whose compliance with its MCL or action level is not based on a running annual average, if the average of the initial and confirmation sample exceeds the contaminant's MCL or action level, or the confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP's project sponsor shall notify the Department and Regional Board within 24 hours and initiate weekly monitoring until four consecutive weekly results are below the contaminant's MCL or action level. If the running four-week average exceeds the contaminant's MCL or action level, the GRRP's project sponsor shall notify the Department and Regional Board within 24 hours and, if directed by the Department or Regional Board, suspend application of the recycled municipal wastewater.

(2) For a contaminant whose compliance with its MCL is based on a running annual average, if the average of the initial and confirmation sample exceeds the contaminant's MCL, or a confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP shall initiate weekly monitoring for the contaminant until the running four-week average no longer exceeds the contaminant's MCL.

(A) If the running four-week average exceeds the contaminant's MCL, a project sponsor shall describe the reason(s) for the exceedance and provide a schedule for completion of corrective actions in a report submitted to the Department and Regional Board no later than 45 days following the quarter in which the exceedance occurred.

(B) If the running four-week average exceeds the contaminant's MCL for sixteen consecutive weeks, a project sponsor shall notify the Department and Regional Board within 48 hours of knowledge of the exceedance and, if directed by the Department or Regional Board, suspend application of the recycled municipal wastewater.

(e) If the annual average of the results of the monitoring performed pursuant to subsection (c) exceeds a contaminant's secondary MCL in Table 64449-A or the upper limit in Table 64449-B, a project sponsor shall initiate quarterly monitoring of the recycled municipal wastewater for the contaminant and, if the running annual average of quarterly-averaged results exceeds a contaminant's secondary MCL or upper limit, describe the reason(s) for the exceedance and any corrective actions taken a report submitted to the Regional Board no later than 45 days following the quarter in which the exceedance occurred, with a copy concurrently provided to the Department. The annual monitoring in subsection (c) may resume if the running annual average of quarterly results does not exceed a contaminant's secondary MCL or upper limit.

(f) If four consecutive quarterly results for asbestos are below the detection limit in Table 64432-A for asbestos, monitoring for asbestos may be reduced to one sample every three years. Quarterly monitoring shall resume if asbestos is detected.

§60320.214. Diluent Water Requirements.

To be credited with diluent water used in calculating an RWC pursuant to section 60320.216, the GRRP shall comply with the requirements of this section and receive Department approval. For diluent water that is a Department-approved drinking water source, the GRRP's project sponsor is exempt from subsections (a) and (b). The GRRP's project sponsor shall:

(a) Monitor the diluent water quarterly for nitrate and nitrite and, within 72 hours of being informed by the laboratory of a nitrate, nitrite, or nitrate plus nitrite result exceeding a maximum contaminant level (MCL), collect a confirmation sample. If the average of the two samples is greater than an MCL;

(1) notify the Department and the Regional Board within 48 hours of receiving the confirmation sample result,

(2) investigate the cause(s) and implement corrective actions, and

(3) each week, collect and analyze two grab samples at least three days apart as specified in the GRRP's Operation Optimization Plan. If the average of the results for a two-week period exceeds the MCL, subsurface application of the diluent water shall not be used in the calculation of RWC until corrective actions are made. Quarterly monitoring may resume if four consecutive results are below the MCL.

(b) Conduct a source water evaluation per the California-Nevada Section of American Water Works Association's Watershed Sanitary Survey Guidance Manual (1993), as it may be amended, or other Department-approved evaluation, of the diluent water for Department review and approval that includes, but is not limited to:

(1) a description of the source of the diluent water;

(2) delineation of the origin and extent of the diluent water;

(3) the susceptibility of the diluent water to contamination;

(4) the identification of known or potential contaminants; and

(5) an inventory of the potential sources of diluent water contamination.

(c) Ensure diluent water does not exceed a primary MCL, a secondary MCL upper limit, or a notification level (NL), and implement a Department-approved water quality monitoring plan for Department-specified contaminants to demonstrate compliance with the primary MCLs, secondary MCLs, and NLs. The plan shall also include:

(1) except for Department-approved drinking water sources used as a diluent water, monitoring of any chemicals or contaminants required pursuant to section 60320.220, based on the source water evaluation performed in subsection (b); and

(2) actions to be taken in the event of non-compliance with a primary MCL, secondary MCL, or exceedance of a NL.

(d) Develop a method for determining the volume of diluent water to be credited and demonstrate that the diluent water will be introduced in a manner such that the diluent water volume will not result in the GRRP's 120-month running monthly average RWC exceeding its maximum RWC at or beyond the boundary established pursuant to section 60320.200(e)(2). The method shall be submitted to the Department for review and approval, and be conducted at a frequency specified in the engineering report prepared pursuant to section 60323. The method shall address all conditions that influence how and when the recycled municipal wastewater and diluent water arrive at all points along the boundary. The conditions must include, but are not limited to, temporal variability in the diluent water supply and regional groundwater gradients, the difference in the distribution of the recycled municipal wastewater and diluent water between individual aquifers where more than one aquifer is replenished, and the difference in travel-time when recycled municipal wastewater and diluent water are introduced at different locations and/or times.

(e) For credit prior to the operation of the GRRP, but not to exceed 120 months:

(1) demonstrate that the diluent water met the nitrate, nitrite, and nitrate plus nitrite MCLs, NLs, and the water quality requirements in section 60320.212;

(2) provide evidence that the quantity of diluent water has been accurately determined and was distributed such that the proposed or permitted maximum RWC would not have been exceeded; and

(3) conduct a source water evaluation of the diluent water pursuant to subsection (b).

(f) In the Operation Optimization Plan prepared pursuant to section 60320.222, include a description of:

(1) how the diluent water will be distributed in a manner that ensures that the maximum RWC will not be exceeded during normal operations; and

(2) the actions to be taken in the event the diluent water is curtailed or is no longer available.

(g) If approved by the Department, recharge water may be monitored in lieu of a diluent water source if the diluent water source cannot be monitored directly in a manner that provides samples representative of the diluent water being applied.

§60320.216. Recycled Municipal Wastewater Contribution (RWC) Requirements.

(a) Each month, for each subsurface application GRRP used for replenishing a groundwater basin, the GRRP's project sponsor shall calculate the running monthly average (RMA) RWC based on the total volume of the recycled municipal wastewater and credited diluent water for the preceding 120 months. For GRRPs in operation less than 120 months, calculation of the RMA RWC shall commence after 30 months of recycled municipal wastewater application, based on the total volume of the recycled municipal wastewater and credited diluent water introduced during the preceding months.

(b) The GRRP's RMA RWC, as determined in subsection (a), shall not exceed the maximum RWC specified for the GRRP by the Department.

(c) The initial maximum RWC, which may be up to 1.0, will be based on, but not limited to, the Department's review of the engineering report, information obtained as a result of the public hearing(s), and a project sponsor's demonstration that the treatment processes will reliably achieve TOC concentrations no greater than 0.5 mg/L.

(d) A GRRP may increase its maximum RWC, provided:

(1) the increase has been approved by the Department and Regional Board;

(2) for the previous 52 weeks the TOC 20-week running average, as monitored pursuant to section 62320.218, has not exceeded 0.5 mg/L; and

(3) the GRRP has received a permit from the Regional Board that allows operation of the GRRP at the increased maximum RWC.

(e) If the RMA RWC exceeds its maximum RWC, the GRRP's project sponsor shall:

(1) notify the Department and Regional Board in writing within seven days of knowledge of the exceedance; and

(2) within 60 days of knowledge of the exceedance, implement corrective action(s) and additional actions that may be required by the Department or Regional Board, and submit a report to the Department and Regional Board describing the reason(s) for the exceedance and the corrective action(s) taken to avoid future exceedances.

§60320.218. Total Organic Carbon Requirements.

(a) For each subsurface application GRRP used for replenishing a groundwater basin, the GRRP's project sponsor shall monitor the applied recycled municipal wastewater for TOC as follows:

(1) Prior to replenishment, at least one 24-hour composite sample each week.

(2) Grab samples may be used in lieu of the 24-hour composite samples required in paragraph (1) if the GRRP demonstrates that a grab sample is representative of the water quality throughout a 24-hour period.

(b) Analytical results of the TOC monitoring performed pursuant to subsection (a) shall not exceed 0.5 mg/L based on:

(1) the 20-week running average of all TOC results; and

(2) the average of the last four TOC results.

(c) If the GRRP exceeds the limit in subsection (b)(1) based on a 20-week running average, a project sponsor shall take the following actions upon being notified of the results:

(1) immediately suspend the addition of recycled municipal wastewater until at least two consecutive results, three days apart, are less than the limit;

(2) notify the Department and Regional Board within seven days of suspension; and

(3) within 60 days, submit a report to the Department and Regional Board describing the reasons for the exceedance and the corrective actions to avoid future exceedances. At a minimum, the corrective actions shall include a reduction of RWC sufficient to comply with the limit.

(d) If the GRRP exceeds the limit in subsection (b)(2) based on the average of the last four results, a project sponsor shall, within 60 days of being notified of the results, submit a report to the Department and Regional Board describing the reasons for the exceedance and the corrective actions taken to avoid future exceedances.

(e) To use one or more wastewater chemicals in lieu of TOC, a project sponsor shall obtain approval from the Department. At a minimum, the chemical(s) used in lieu of TOC shall:

(1) be quantifiable in the wastewater, recycled municipal wastewater, groundwater, and throughout the treatment processes; and

(2) have identifiable treatment performance standards as protective of public health as the TOC standards in this Article.

§60320.220. Additional Chemical and Contaminant Monitoring.

(a) Each quarter, the GRRP's project sponsor shall sample and analyze the recycled municipal wastewater and the groundwater (from the downgradient monitoring wells established pursuant to section 60320.226) for the following:

(1) Priority Toxic Pollutants (chemicals listed in 40 CFR section 131.38, "Establishment of numeric criteria for priority toxic pollutants for the State of California", as the foregoing may be amended) specified by the Department, based on the Department's review of the GRRP's engineering report; and

(2) Chemicals that the Department has specified, based on a review of the GRRP's engineering report, the affected groundwater basin(s), and the results of the assessment performed pursuant to section 60320.206(b)(1).

(b) Each quarter, the GRRP's project sponsor shall sample and analyze the recycled municipal wastewater for Department-specified chemicals having notification levels (NLs). Recharge water may be monitored in lieu of recycled municipal wastewater if the fraction of recycled municipal wastewater in the recharge water is equal to or greater than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter. If the fraction of recycled municipal wastewater in the recharge water being monitored is less than the average fraction of recycled municipal wastewater in the recharge water applied over the quarter, the reported value shall be adjusted to exclude the effects of dilution. If a result exceeds a NL, within 72 hours of notification of the result a project sponsor shall collect another sample and have it analyzed for the contaminant as confirmation. If the average of the initial and confirmation sample exceeds the contaminant's NL, or a confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP shall initiate weekly monitoring for the contaminant until the running four-week average no longer exceeds the NL.

(1) If the running four-week average exceeds the contaminant's NL, a project sponsor shall describe the reason(s) for the exceedance and provide a schedule for completion of corrective actions in a report submitted to the Regional Board no later than 45 days following the quarter in which the exceedance occurred, with a copy concurrently provided to the Department.

(2) If the running four-week average exceeds the contaminant's NL for sixteen consecutive weeks, a project sponsor shall notify the Department and Regional Board within 48 hours of knowledge of the exceedance.

(c) A project sponsor may reduce monitoring for the chemicals in this section to once each year following Department approval based on the Department's review of the most recent two years of results of the monitoring performed pursuant to this section.

(d) Annually, a project sponsor shall monitor the recycled municipal wastewater for indicator compounds specified by the Department and Regional Board based on the following:

(1) a review of the GRRP's engineering report;

(2) the inventory developed pursuant to section 60320.206(b)(4);

(3) the affected groundwater basin(s);

(4) an indicator compound's ability to characterize the presence of pharmaceuticals, endocrine disrupting chemicals, personal care products, and other indicators of the presence of municipal wastewater; and

(5) the availability of a test method for a chemical.

(e) A chemical or contaminant detected as a result of monitoring conducted pursuant to this section shall be reported to the Department and Regional Board no later than the quarter following the quarter in which the results are received by the GRRP's project sponsor.

§60320.222. Operation Optimization and Plan.

(a) Prior to operation of a GRRP, a project sponsor shall submit an Operation Optimization Plan to the Department and Regional Board for review and approval. At a minimum, the Operation Optimization Plan shall identify and describe the operations, maintenance, analytical methods, monitoring necessary for the GRRP to meet the requirements of this Article, and the reporting of monitoring results to the Department and Regional Board. A project sponsor shall be responsible for ensuring that the

Operation Optimization Plan is, at all times, representative of the current operations, maintenance, and monitoring of the GRRP. A GRRP's project sponsor shall make the Operation Optimization Plan available to the Department or Regional Board for review upon request.

(b) During the first year of operation of a GRRP and at all times thereafter, all treatment processes shall be operated in a manner providing optimal reduction of all chemicals and contaminants including:

(1) microbial contaminants;

(2) regulated contaminants identified in section 60320.212 and the nitrogen compounds required pursuant to section 60320.210; and

(3) chemicals and contaminants required pursuant to section 60320.220.

(c) Within six months of optimizing treatment processes pursuant to subsection (b) and anytime thereafter operations are optimized that result in a change in operation, a project sponsor shall update the GRRP's Operation Optimization Plan to include such changes in operational procedures and submit the operations plan to the Department for review.

§60320.224. Response Retention Time.

(a) The recycled municipal wastewater applied by a GRRP shall be retained underground for a period of time necessary to allow a project sponsor sufficient response time to identify treatment failures and implement actions, including those required pursuant to section 60320.200(b), necessary for the protection of public health.

(b) The response retention time required in subsection (a) must be approved by the Department, based on information provided in the engineering report required pursuant to section 60323. The response retention time shall be no less than two months.

(c) To demonstrate the retention time underground is no less than the response retention time approved pursuant to subsection (b), a tracer study utilizing an added tracer shall be implemented under hydraulic conditions representative of normal GRRP operations. With Department approval, an intrinsic tracer may be used in lieu of an added tracer. For each month of retention time estimated utilizing the approved intrinsic tracer, a project sponsor shall receive no more than 0.67 months credit. The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reaches the monitoring point. A project sponsor for a GRRP shall initiate the tracer study prior to the end of the third month of operation. A project sponsor for a GRRP permitted on or before June 18, 2014, that has not performed a tracer study shall complete a tracer study demonstrating the retention time underground.

(d) For the purpose of siting a GRRP location during project planning and until a GRRP's project sponsor has met the requirements of subsection (c), for each month of retention time estimated using the method in column 1, the recycled municipal wastewater or recharge water may be credited with no more than the corresponding response time in column 2 of Table 60320.224.

Table 60320.224

Column 1	**Column 2**
Method used to estimate the retention time	**Response Time Credit per Month**
Tracer study utilizing an added tracer.[1]	1.0 month
Tracer study utilizing an intrinsic tracer.[1]	0.67 month
Numerical modeling consisting of calibrated finite element or finite difference models using validated and verified computer codes used for simulating groundwater flow.	0.50 month
Analytical modeling using existing academically-accepted equations such as Darcy's Law to estimate groundwater flow conditions based on simplifying aquifer assumptions.	0.25 month

[1] The retention time shall be the time representing the difference from when the water with the tracer is applied at the GRRP to when either; two percent (2%) of the initially introduced tracer concentration has reached the downgradient monitoring point, or ten percent (10%) of the peak tracer unit value observed at the downgradient monitoring point reaches the monitoring point.

(e) A project sponsor shall obtain Department approval for the protocol(s) to be used to establish the retention times in subsections (c) and (d).

(f) Upon request from the Department, a project sponsor shall demonstrate that the underground retention times required in this section are being met based on changes in hydrogeological or climatic conditions since the most recent demonstration.

§60320.226. Monitoring Well Requirements.

(a) Prior to operating a GRRP, a project sponsor shall site and construct at least two monitoring wells downgradient of the GRRP such that:

(1) at least one monitoring well is located;

(A) no less than two weeks but no more than six months of travel time from the GRRP, and

(B) at least 30 days upgradient of the nearest drinking water well;

(2) in addition to the well(s) in paragraph (1) and after consultation with the Department, at least one monitoring well is located between the GRRP and the nearest downgradient drinking water well; and

(3) samples from the monitoring wells in paragraphs (1) and (2) can be;

(A) obtained independently from each aquifer initially receiving the water used as a source of drinking water supply that will receive the GRRP's recharge water, and

(B) validated as receiving recharge water from the GRRP.

(b) In addition to the monitoring required pursuant to section 60320.220, from each monitoring well in subsection (a)(1), and each monitoring well in subsection (a)(2) that has recharge water located within one year travel time of the well(s), a project sponsor shall collect two samples prior to GRRP operation and at least one sample each quarter after operation begins. Each sample shall be analyzed for total nitrogen, nitrate, nitrite, the contaminants in Tables 64449-A and B of section 64449, and any contaminants and chemicals specified by the Department or Regional Board based on the results of the recycled municipal wastewater monitoring conducted pursuant to this Article.

(c) If a result from the monitoring conducted pursuant to subsection (b) exceeds 80 percent of a nitrate, nitrite, or nitrate plus nitrite MCL a project sponsor shall, within 48 hours of being notified of the result by the laboratory, collect another sample and have it analyzed for the contaminant. If the average of the result of the initial sample and the confirmation sample exceed the contaminant's MCL, a project sponsor shall:

(1) within 24 hours of being notified by the laboratory of the confirmation sample result, notify the Department and Regional Board; and

(2) discontinue subsurface application of recycled municipal wastewater until corrective actions have been taken or evidence is provided to the Department and Regional Board that the contamination was not a result of the GRRP.

(d) For Department-specified chemical analyses completed in a month, a project sponsor shall ensure the laboratory electronically submits results to the Department no later than 45 days after the end of the month in which monitoring occurred, in a manner such that data is readily uploaded into the Department's database. Utilization of the process described on the Department's Web site will satisfy this requirement.

(e) The GRRP's project sponsor may discontinue monitoring for the chemicals and contaminants in subsection (b) following Department approval based on the Department's review of the most recent two years of monitoring results.

§60320.228. Reporting.

(a) No later than six months after the end of each calendar year, a project sponsor shall provide a report to the Department and Regional Board. Public water systems and drinking water well owners having downgradient sources potentially affected by the GRRP and within 10 years groundwater travel time from the GRRP shall be notified by direct mail and/or electronic mail of the availability of the report. The report shall be prepared by an engineer licensed in California and experienced in the fields of wastewater treatment and public water supply. The report shall include the following:

(1) A summary of the GRRP's compliance status with the monitoring requirements and criteria of this Article during the previous calendar year;

(2) For any violations of this Article during the previous calendar year;

(A) the date, duration, and nature of the violation,

(B) a summary of any corrective actions and/or suspensions of subsurface application of recycled municipal wastewater resulting from a violation, and

(C) if uncorrected, a schedule for and summary of all remedial actions;

(3) Any detections of monitored chemicals or contaminants, and any observed trends in the monitoring wells and diluent water supplies;

(4) Information pertaining to the vertical and horizontal migration of the recharge water plume;

(5) A description of any changes in the operation of any unit processes or facilities;

(6) A description of any anticipated changes, along with an evaluation of the expected impact of the changes on subsequent unit processes;

(7) The estimated quantity and quality of the recycled municipal wastewater and diluent water to be applied for the next calendar year;

(8) A summary of the measures taken to comply with section 60320.206 and 60320.200(j), and the effectiveness of the implementation of the measures; and

(9) Increases in RWC during the previous calendar year and RWC increases anticipated for the next calendar year.

(b) Every five years from the date of the initial approval of the engineering report required pursuant to section 60323, a project sponsor shall update the report to address any project changes and submit the report to the Department and Regional Board. The update shall include, but not be limited to:

(1) anticipated RWC increases, a description of how the RWC requirements in section 60320.216 will be met, and the expected impact the increase will have on the GRRP's ability to meet the requirements of this Article;

(2) evidence that the requirements associated with retention time in section 60320.208, if applicable, and section 60320.224 have been met; and

(3) a description of any inconsistencies between previous groundwater model predictions and the observed and/or measured values, as well as a description of how subsequent predictions will be accurately determined.

§60320.230. Alternatives.

(a) A project sponsor may use an alternative to a requirement in this Article if the GRRP's project sponsor:

(1) demonstrates to the Department that the proposed alternative assures at least the same level of protection to public health;

(2) receives written approval from the Department prior to implementation of the alternative; and

(3) if required by the Department or Regional Board, conducts a public hearing on the proposed alternative, disseminates information to the public, and receives public comments, pursuant to sections 60320.202(b) and (c).

(b) Unless specified otherwise by the Department, the demonstration in subsection (a)(1) shall include the results of a review of the proposed alternative by an independent scientific advisory panel that includes a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years of experience in wastewater treatment and public drinking water supply, a microbiologist, and a chemist.

Article 5.5. Other Methods of Treatment.

§60320.5. Other methods of treatment.

Methods of treatment other than those included in this chapter and their reliability features may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the methods of treatment and reliability features will assure an equal degree of treatment and reliability.

Article 6. Sampling and Analysis.

§60321. Sampling and analysis.

(a) Disinfected secondary-23, disinfected secondary-2.2, and disinfected tertiary recycled water shall be sampled at least once daily for total coliform bacteria. The samples shall be taken from the disinfected effluent and shall be analyzed by an approved laboratory.

(b) Disinfected tertiary recycled water shall be continuously sampled for turbidity using a continuous turbidity meter and recorder following filtration. Compliance with the daily average operating filter effluent turbidity shall be determined by averaging the levels of recorded turbidity taken at four-hour intervals over a 24-hour period. Compliance with turbidity pursuant to section 60301.320 (a)(2)(B) and (b)(1) shall be determined using the levels of recorded turbidity taken at intervals of no more than 1.2-hours over a 24- hour period. Should the continuous turbidity meter and recorder fail, grab sampling at a minimum frequency of 1.2-hours may be substituted for a period of up to 24-hours. The results of the daily average turbidity determinations shall be reported quarterly to the regulatory agency.

(c) The producer or supplier of the recycled water shall conduct the sampling required in subsections (a) and (b).

Article 7. Engineering Report and Operational Requirements.

§60323. Engineering report.

(a) No person shall produce or supply recycled water for reuse from a water reclamation plant without a Department-approved engineering report.

(b) The report shall be prepared by a qualified engineer licensed 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.

§60325. Personnel.

(a) Each reclamation plant shall be provided with a sufficient number of qualified personnel to operate the facility effectively so as to achieve the required level of treatment at all times.

(b) Qualified personnel shall be those meeting requirements established pursuant to Chapter 9 (commencing with Section 13625) of the Water Code.

§60327. Maintenance.

A preventive maintenance program shall be provided at each reclamation plant to ensure that all equipment is kept in a reliable operating condition.

§60329. Operating records and reports.

(a) Operating records shall be maintained at the reclamation plant or a central depository within the operating agency. These shall include: all analyses specified in the reclamation criteria; records of operational problems, plant and equipment breakdowns, and diversions to emergency storage or disposal; all corrective or preventive action taken.

(b) Process or equipment failures triggering an alarm shall be recorded and maintained as a separate record file. The recorded information shall include the time and cause of failure and corrective action taken.

(c) A monthly summary of operating records as specified under (a) of this section shall be filed monthly with the regulatory agency.

(d) Any discharge of untreated or partially treated wastewater to the use area, and the cessation of same, shall be reported immediately by telephone to the regulatory agency, the State Department of Health, and the local health officer.

§60331. Bypass.

There shall be no bypassing of untreated or partially treated wastewater from the reclamation plant or any intermediate unit processes to the point of use.

Article 8. General Requirements of Design.

§60333. Flexibility of design.

The design of process piping, equipment arrangement, and unit structures in the reclamation plant must allow for efficiency and convenience in operation and maintenance and provide flexibility of operation to permit the highest possible degree of treatment to be obtained under varying circumstances.

§60335. Alarms.

(a) Alarm devices required for various unit processes as specified in other sections of these regulations shall be installed to provide warning of:

(1) Loss of power from the normal power supply.

(2) Failure of a biological treatment process.

(3) Failure of a disinfection process.

(4) Failure of a coagulation process.

(5) Failure of a filtration process.

(6) Any other specific process failure for which warning is required by the regulatory agency.

(b) All required alarm devices shall be independent of the normal power supply of the reclamation plant.

(c) The person to be warned shall be the plant operator, superintendent, or any other responsible person designated by the management of the reclamation plant and capable of taking prompt corrective action.

(d) Individual alarm devices may be connected to a master alarm to sound at a location where it can be conveniently observed by the attendant. In case the reclamation plant is not attended full time, the alarm(s) shall be connected to sound at a police station, fire station or other full time service unit with which arrangements have been made to alert the person in charge at times that the reclamation plant is unattended.

§60337. Power supply.

The power supply shall be provided with one of the following reliability features:

(a) Alarm and standby power source.

(b) Alarm and automatically actuated short-term retention or disposal provisions as specified in Section 60341.

(c) Automatically actuated long-term storage or disposal provisions as specified in Section 60341.

Article 9. Reliability Requirements for Primary Effluent.

§60339. Primary treatment.

Reclamation plants producing reclaimed water exclusively for uses for which primary effluent is permitted shall be provided with one of the following reliability features:

(a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Long-term storage or disposal provisions as specified in Section 60341.

Article 10. Reliability Requirements for Full Treatment.

§60341. Emergency storage or disposal.

(a) Where short-term retention or disposal provisions are used as a reliability feature, these shall consist of facilities reserved for the purpose of storing or disposing of untreated or partially treated wastewater for at least a 24-hour period. The facilities shall include all the necessary diversion devices, provisions for odor control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(b) Where long-term storage or disposal provisions are used as a reliability feature, these shall consist of ponds, reservoirs, percolation areas, downstream sewers leading to other treatment or disposal facilities or any other facilities reserved for the purpose of emergency storage or disposal of untreated or partially treated wastewater. These facilities shall be of sufficient capacity to provide disposal or storage of wastewater for at least 20 days, and shall include all the necessary diversion works, provisions for odor and nuisance control, conduits, and pumping and pump back equipment. All of the equipment other than the pump back equipment shall be either independent of the normal power supply or provided with a standby power source.

(c) Diversion to a less demanding reuse is an acceptable alternative to emergency disposal of partially treated wastewater provided that the quality of the partially treated wastewater is suitable for the less demanding reuse.

(d) Subject to prior approval by the regulatory agency, diversion to a discharge point which requires lesser quality of wastewater is an acceptable alternative to emergency disposal of partially treated wastewater.

(e) Automatically actuated short-term retention or disposal provisions and automatically actuated long-term storage or disposal provisions shall include, in addition to provisions of (a), (b), (c), or (d) of this section, all the necessary sensors, instruments, valves and other devices to enable fully automatic diversion of untreated or partially treated wastewater to approved emergency storage or disposal in the event of failure of a treatment process and a manual reset to prevent automatic restart until the failure is corrected.

§60343. Primary treatment.
All primary treatment unit processes shall be provided with one of the following reliability features:

(a) Multiple primary treatment units capable of producing primary effluent with one unit not in operation.

(b) Standby primary treatment unit process.

(c) Long-term storage or disposal provisions.

§60345. Biological treatment.
All biological treatment unit processes shall be provided with one of the following reliability features:

(a) Alarm and multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation.

(b) Alarm, short-term retention or disposal provisions, and standby replacement equipment.

(c) Alarm and long-term storage or disposal provisions.

(d) Automatically actuated long-term storage or disposal provisions.

§60347. Secondary sedimentation.
All secondary sedimentation unit processes shall be provided with one of the following reliability features:

(a) Multiple sedimentation units capable of treating the entire flow with one unit not in operation.

(b) Standby sedimentation unit process.

(c) Long-term storage or disposal provisions.

§60349. Coagulation.
(a) All coagulation unit processes shall be provided with the following mandatory features for uninterrupted coagulant feed:

(1) Standby feeders,
(2) Adequate chemical stowage and conveyance facilities,
(3) Adequate reserve chemical supply, and
(4) Automatic dosage control.

(b) All coagulation unit processes shall be provided with one of the following reliability features:

(1) Alarm and multiple coagulation units capable of treating the entire flow with one unit not in operation;

(2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;

(3) Alarm and long-term storage or disposal provisions;

(4) Automatically actuated long-term storage or disposal provisions, or

(5) Alarm and standby coagulation process.

§60351. Filtration.

All filtration unit processes shall be provided with one of the following reliability features:

(a) Alarm and multiple filter units capable of treating the entire flow with one unit not in operation.

(b) Alarm, short-term retention or disposal provisions and standby replacement equipment.

(c) Alarm and long-term storage or disposal provisions.

(d) Automatically actuated long-term storage or disposal provisions.

(e) Alarm and standby filtration unit process.

§60353. Disinfection.

(a) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with the following features for uninterrupted chlorine feed:

(1) Standby chlorine supply,

(2) Manifold systems to connect chlorine cylinders,

(3) Chlorine scales, and

(4) Automatic devices for switching to full chlorine cylinders. Automatic residual control of chlorine dosage, automatic measuring and recording of chlorine residual, and hydraulic performance studies may also be required.

(b) All disinfection unit processes where chlorine is used as the disinfectant shall be provided with one of the following reliability features:

(1) Alarm and standby chlorinator;

(2) Alarm, short-term retention or disposal provisions, and standby replacement equipment;

(3) Alarm and long-term storage or disposal provisions;

(4) Automatically actuated long-term storage or disposal provisions; or

(5) Alarm and multiple point chlorination, each with independent power source, separate chlorinator, and separate chlorine supply.

§60355. Other alternatives to reliability requirements

Other alternatives to reliability requirements set forth in Articles 8 to 10 may be accepted if the applicant demonstrates to the satisfaction of the State Department of Health that the proposed alternative will assure an equal degree of reliability.

* * * * *

APPENDIX C

LPVCWD 2015 Consumer Confidence Report

2015 Consumer Confidence Report

La Puente Valley County Water District
92 Years of Service

KNOW YOUR WATER

The La Puente Valley County Water District is committed to keeping you informed about the quality of your drinking water. This report is provided to you annually and it includes information describing where your drinking water comes from, the constituents found in your drinking water and how the water quality compares with the regulatory standards. Last year we conducted various tests for over 100 contaminants. Many tests were performed weekly to ensure high quality water is delivered to your home. We are proud to report that during 2015, the drinking water provided by the District met or surpassed all Federal and State drinking water standards.

The District remains dedicated to providing you with a reliable supply of high quality drinking water.

This report contains important information about your drinking water. Translate it or speak with someone who understands it. For more information or questions regarding this report, please contact Mr. Greg Galindo at (626) 330-2126.

Este informe contiene información muy importante sobre su agua de beber. Tradúzcalo ó hable con alguien que lo entienda bien. Para más información o preguntas con respecto a este informe, póngase en contacto con el Sr. Greg Galindo (626) 330-2126.

CONNECT WITH US

BOARD OF DIRECTORS

Henry P. Hernandez
President

David Hastings
Vice President

Charlie Aguirre
Director

John P. Escalera
Director

William R. Rojas
Director

GENERAL INFORMATION

Office Hours: Monday - Friday 8 a.m.-5 p.m.
Phone: (626) 330-2126
Fax: (626) 330-2679
E-mail: service@lapuentewater.com

After hours emergency service:
(626) 330-2126

GOVERNANCE

The La Puente Valley County Water District was founded in August of 1924 and is governed by a five member Board of Directors that is elected at large from its service area. Regularly scheduled board meetings of The La Puente Valley County Water District are held on the second and fourth Monday of each month at 5:30 pm at 112 North First Street, La Puente, CA 91744. These meetings provide an opportunity for the public to participate in decisions that may affect the quality of your water.

WHERE DOES MY DRINKING WATER COME FROM?

WATER SOURCES

La Puente Valley County Water District's groundwater supply comes from Wells 2, 3, and 5 located in the Main San Gabriel Basin along with Industry Public Utilities' Well 5 (In turn, Industry Public Utilities receives water from both San Gabriel Valley Water Company and La Puente Valley County Water District). Well water is treated by an air-stripping unit, ion-exchange unit, and ultraviolet light. Final treated water is then disinfected with chlorine before it is delivered to your home.

The treatment technologies and processes mentioned above are permitted and regulated by the State Water Resources Control Board, Division of Drinking Water (DDW).

DRINKING WATER SOURCE ASSESSMENT

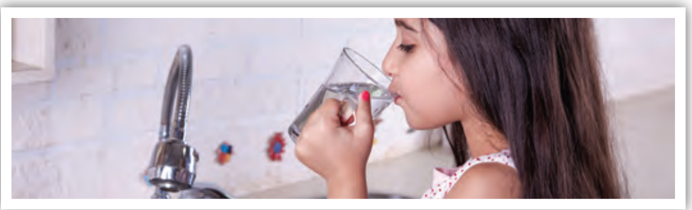
In accordance with the Federal Safe Drinking Water Act, an assessment of the drinking water sources for La Puente Valley County Water District was completed in March 2008. The purpose of the drinking water source assessment is to promote source water protection by identifying types of activities in the proximity of the drinking water sources which could pose a threat to the water quality. The assessment concluded that the La Puente Valley County Water District's sources are considered most vulnerable to the following activities or facilities associated with contaminants detected in the water supply: leaking underground storage tanks, known contaminant plumes and high density of housing. In addition, the sources are considered most vulnerable to the following facility not associated with contaminants detected in the water supply: transportation corridors – freeways/state highways. A copy of the complete assessment is available at La Puente Valley County Water District at 112 North First Street, La Puente, CA 91744. You may request a summary of the assessment by contacting Mr. Greg Galindo at 626-330-2126.

An assessment of the drinking water sources for SGVWC was updated in October 2008. The assessment concluded that SGVWC's sources are considered most vulnerable to the following activities or facilities associated with contaminants detected in the water supply: leaking underground storage tanks, hardware/lumber/parts stores, hospitals, gasoline stations, and known contaminant plumes. In addition, the sources are considered most vulnerable to the following activities or facilities not associated with contaminants detected in the water supply: above ground storage tanks, spreading basins, storm drain discharge points and transportation corridors. You may request a summary of the assessment by contacting Mr. Greg Galindo at (626) 330-2126.

QUESTIONS?

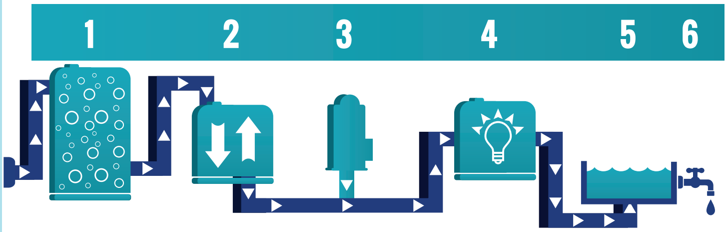
For more information or questions regarding this report, please contact Mr. Greg Galindo at 626-330-2126.

Este informe contiene información muy importante sobre su agua potable. Para más información o preguntas con respecto a este informe, póngase en contacto con el Sr. Greg Galindo. Telefono: 626-330-2126.



THE TREATMENT PROCESS

La Puente Valley County Water District has developed and implemented a water treatment process comprised of separate treatment components designed to treat specific types of contaminants: after water is pumped from our wells, it flows through two parallel air stripping towers, an ion exchange system, one hydrogen peroxide injection system, and two ultraviolet light reactors operating in a series. After treatment, water is then piped to a booster station and then into the District's water system. This entire process is monitored closely and the water is sampled regularly to verify the treatment systems are effective.



Water moving through the treatment system flows as follows:

1. Air stripping towers remove VOCs to below detection levels.

2. An ion exchange system uses resin specially manufactured to remove perchlorate.

3. A hydrogen peroxide injection system injects hydrogen peroxide in preparation for the UV reactors.

4. UV reactors remove NDMA and 1, 4-dioxane.

5. Water exiting the facility is chlorinated to provide a disinfectant residual in the water system.

6. Treated water then enters the District's water system and is delivered to your home.

WHAT ARE DRINKING WATER STANDARDS?

In order to ensure that tap water is safe to drink, the United States Environmental Protection Agency (USEPA) and DDW prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. DDW regulations also establish limits for contaminants in bottled water that provide the same protection for public health.

Drinking water standards established by USEPA and DDW set limits for substances that may affect consumer health or aesthetic qualities of drinking water. The chart in this report shows the following types of water quality standards:

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. Primary MCLs are set as close to the PHGs (or MCLGs) as is economically and technologically feasible.

Secondary MCLs are set to protect the odor, taste, and appearance of drinking water.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Primary Drinking Water Standard (PDWS): MCLs for contaminants that affect health along with their monitoring and reporting requirements and water treatment requirements.

Regulatory Action Level (AL): The concentration of a contaminant, which, if exceeded, triggers treatment or other requirements that a water system must follow.

Notification Level (NL): An advisory level which, if exceeded, requires the drinking water system to notify the governing body of the local agency in which users of the drinking water reside (i.e. city council/county board of supervisors).

In addition to mandatory water quality standards, USEPA and DDW have set voluntary water quality goals for some contaminants. Water quality goals are often set at such low levels that they are not achievable in practice and are not directly measurable. Nevertheless, these goals provide useful guideposts and direction for water management practices. The chart in this report includes three types of water quality goals:

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs are set by the USEPA.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contaminants.

Public Health Goal (PHG): The level of a contaminant in drinking water below which there is no known or expected risk to health. PHGs are set by the California Environmental Protection Agency.

WHAT CONTAMINANTS MAY BE PRESENT IN SOURCES OF DRINKING WATER?

The sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals and, in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants, such as viruses and bacteria that may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

Inorganic contaminants, such as salts and metals, that can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

Pesticides and herbicides, which may come from a variety of sources such as agriculture, urban stormwater runoff and residential uses.

Organic chemical contaminants, including synthetic and volatile organic chemicals that are by-products of industrial processes and petroleum production, and can also come from gasoline stations, urban stormwater runoff, agricultural application, and septic systems.

Radioactive contaminants, which can be naturally-occurring or can be the result of oil and gas production and mining activities.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the USEPA's Safe Drinking Water Hotline (1-800-426-4791).

WHAT IS IN MY DRINKING WATER?

Your drinking water is tested by certified professional water system operators and certified laboratories to ensure its safety. The chart in this report shows the average and range of concentrations of the constituents tested in your drinking water during year 2015 or from the most recent tests. The State allows us to monitor for some contaminants less than once per year because the concentrations of these contaminants do not change frequently. Some of our data, though representative, are more than one year old. The chart lists all the contaminants **detected** in your drinking water that have Federal and State drinking water standards. Detected unregulated contaminants of interest are also included.

ARE THERE ANY PRECAUTIONS THE PUBLIC SHOULD CONSIDER?

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. USEPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infection by Cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (1-800-426-4791).

INFORMATION ON LEAD IN DRINKING WATER

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. The La Puente Valley County Water District is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at: https://www.epa.gov/lead.

NITRATE ADVISORY

At times, nitrate in your tap water may have exceeded one-half the MCL, but it was never greater than the MCL. The following advisory is issued because in 2015 the District recorded a nitrate measurement in its treated drinking water which exceeded one-half the nitrate MCL.

"Nitrate in drinking water at levels above 10 milligrams per liter (mg/L) is a health risk for infants of less than six months of age. Such nitrate levels in drinking water can interfere with the capacity of the infant's blood to carry oxygen, resulting in a serious illness; symptoms include shortness of breath and blueness of the skin. Nitrate levels above 10 mg/L may also affect the ability of the blood to carry oxygen in other individuals, such as pregnant women and those with certain specific enzyme deficiencies. If you are caring for an infant, or you are pregnant, you should ask advice from your health care provider."

2015 SAMPLE RESULTS

PRIMARY STANDARDS

ANALYTE	YEAR SAMPLED	UNIT	MCL (MRDL)	PHG (MCLG)	DLR	AVERAGE [1]	RANGE	VIOLATION	MAJOR SOURCE OF CONTAMINANT
INORGANIC CHEMICALS									
Arsenic	2015	µg/l	10	0.004	2	<2 [2]	ND - 3	No	Erosion of natural deposits
Barium	2015	mg/l	1	2	0.1	0.1	ND - 0.19	No	Discharges of oil drilling wastes and from metal refineries; erosion of natural deposits
Fluoride	2015	mg/l	2	1	0.1	0.39	0.23 - 0.43	No	Erosion of natural deposits
Hexavalent Chromium	2015	µg/l	10	0.02	1	3.3	2.1 - 4.7	No	Erosion of natural deposits; industrial waste discharge
Nitrate as N	2015	mg/l	10	10	0.4	7.1	1.7 - 8.4	No	Leaching from fertilizer use
RADIOLOGICALS									
Gross Beta Particle Activity	2015	pCi/L	15	(0)	3	<3 [2]	ND - 12	No	Decay of natural and man-made deposits
Uranium	2015	pCi/L	20	0.43	1	2.3	1.2 - 5.7	No	Erosion of natural deposits

SECONDARY STANDARDS

ANALYTE	YEAR SAMPLED	UNIT	MCL (MRDL)	PHG (MCLG)	DLR	AVERAGE	RANGE	VIOLATION	MAJOR SOURCE OF CONTAMINANT
Chloride	2015	mg/l	500	NA	NA	29	19 - 44	No	Runoff/leaching from natural deposits
Foaming Agents	2015	µg/l	500	NA	NA	<50[3]	ND - 50	No	Municipal and industrial waste discharges
Odor-Threshold [7]	2015	TON	3	NA	1	1	1	No	Naturally occurring organic materials
Total Dissolved Solids	2015	mg/l	1,000	NA	NA	330	260 - 530	No	Runoff/leaching from natural deposits
Specific Conductance	2015	µmho/cm	1,600	NA	NA	540	410 - 790	No	Substances that from ions in water
Sulfate	2015	mg/l	500	NA	0.5	54	26 - 70	No	Runoff/leaching from natural deposits

OTHER CONSTITUENTS OF INTEREST

ANALYTE	YEAR SAMPLED	UNIT	MCL (MRDL)	PHG (MCLG)	DLR	AVERAGE	RANGE	VIOLATION	MAJOR SOURCE OF CONTAMINANT
Alkalinity	2015	mg/l	NA	NA	NA	150	140 - 270	No	Runoff/leaching from natural deposits
Calcium	2015	mg/l	NA	NA	NA	64	54 - 110	No	Runoff/leaching from natural deposits
Hardness (as $CaCO_3$)	2015	mg/l	NA	NA	NA	210	180 - 350	No	Runoff/leaching from natural deposits
Magnesium	2015	mg/l	NA	NA	NA	14	10 - 20	No	Runoff/leaching from natural deposits
pH	2015	Unit	NA	NA	NA	8	7.8 - 8	No	Hydrogen ion concentration
Potassium	2015	mg/l	NA	NA	NA	2.7	2.6 - 5.1	No	Runoff/leaching from natural deposits
Sodium	2015	mg/l	NA	NA	NA	25	13 - 29	No	Runoff/leaching from natural deposits

UNREGULATED SUBSTANCES [4]

ANALYTE	YEAR SAMPLED	UNIT	MCL (MRDL)	PHG (MCLG)	AVERAGE	RANGE	VIOLATION	MAJOR SOURCE OF CONTAMINANT
Chlorate	2015	µg/l	800	NA	260	210 - 300	No	Byproduct of drinking water chlorination; industrial processes
Chlorodifluoromethane	2015	µg/l	NA	NA	<0.08	ND - 0.13	No	Refrigerant
Molybdenum	2015	µg/l	NA	NA	2.6	2.3 - 2.8	No	Runoff/leaching from natural deposits
Strontium	2015	µg/l	NA	NA	630	590 - 660	No	Runoff/leaching from natural deposits
Vanadium	2015	µg/l	50	NA	1.6	ND - 3.2	No	Runoff/leaching from natural deposits

DISTRIBUTION SYSTEM WATER QUALITY

ANALYTE	YEAR SAMPLED	UNIT	MCL (MRDL)	PHG (MCLG)	AVERAGE	RANGE	MAJOR SOURCE OF CONTAMINANT
Total Coliform Bacteria	2015	positive/ negative	< 1 positive monthly sample	0	0	--	Naturally present in the environment
Total Trihalomethanes	2015	µg/l	80	NA	14	8.2 - 14	By-product of drinking water chlorination
Haloacetic Acids	2015	µg/l	60	NA	1.4	1.3 - 1.4	By-product of drinking water chlorination
Chlorine Residual	2015	mg/l	(4)	(4)	0.92	0.79 - 1.1	Drinking water disinfectant added for treatment
Odor-Threshold [7]	2015	TON	3	NA	1	1	Naturally occurring organic materials
Turbidity [7]	2015	NTU	5	NA	<0.1 [2]	ND - 0.16	Runoff/leaching from natural deposits

LEAD & COPPER

ANALYTE	YEAR SAMPLED	UNIT	AL	PHG (MCLG)	90TH %TILE	SITES ABOVE AL	MAJOR SOURCE OF CONTAMINANT
Lead	2014	µg/l	15	0.2	ND <5	1/24	Corrosion of household plumbing
Copper	2014	mg/l	1.3	0.3	0.11	0/24	Corrosion of household plumbing

A total of 24 residences were tested for lead and copper in July 2014. Lead was detected in one sample, which exceeded the AL. Copper was detected in 16 samples, none of which exceeded the AL. The ALs for lead and copper are the concentrations which, if exceeded in more than ten percent of the samples tested, triggers treatment or other requirements that a water system must follow. In 2014, lead was detected over the AL in less than ten percent of the samples; therefore, La Puente Valley County Water District complied with the lead action level. The next required sampling for lead and copper will be performed in the summer of 2017.

NOTES

AL = Action Level
DLR = Detection Limit for Purposes of Reporting
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
mg/l = parts per million or milligrams per liter
ng/l = parts per trillion or nanograms per liter

MRDL = Maximum Residual Disinfectant Level
MRDLG = Maximum Residual Disinfectant Level Goal
NA = No Applicable Limit
ND = Not Detected at DLR
NL = Notification Level
TON = Threshold Odor Number

NTU = Nephelometric Turbidity Units
pCi/l = picoCuries per liter
PHG = Public Health Goal
µg/l = parts per billion or micrograms per liter
µmho/cm = micromhos per centimeter

1. The results reported in the table are average concentrations of the constituents detected in your drinking water during year 2015 or from the most recent tests. Treated water data from La Puente Valley County Water District and Industry Public Utilities.
2. Constituent was detected but the average result is less than the DLR.
4. Constituent does not have a DLR. Constituent was detected but the average result is less than the analytical Method Reporting Limit.
6. Monitoring data from Industry Public Utilities.
7. This water quality is regulated by a secondary standard to maintain aesthetic characteristics (taste, odor, color).

APPENDIX D

Raw Fire Flow Data

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/7/2016
Time:
Hydrant Test No. 1 / 11
Field Technician:

Location Information

Pressure Zone: 1
District Atlas Map Page: H8

Street Where Hydrant is Located: Sierra Vista Ct
Nearest Cross Street: N. 5th Street
Location of Hydrant: SW corner of Sierra Vista Ct and N. 5th Street

Field Data

Size of Hydrant (in.): 6
Elevation of Hydrant : 350 ft
Fire Flow Available at Hydrant: 1047.871633 gpm
Residual Pressure: 57 psi

Diameter of Outlet (in.): 2.5
C Factor: 0.9
Pitot Pressure (psi): 39
Static Pressure (psi): 59

Reservoir Data

Name of Reservoir: Main St. 3 MG
Water Level at Reservoir: 28.3 ft

Name of Reservoir: Main St. 1.8 MG
Water Level at Reservoir: 26.1

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Hudson Booster Station
Pump No: 2
Flow at Pump Station: 940 gpm
Pressure at Pump Station: unknown psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:
Flow at Interconnection: gpm
Pressure at Interconnection: psi

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/7/2016
Time:
Hydrant Test No. 2 / 11
Field Technician:

Location Information

Pressure Zone: 1
District Atlas Map Page: G10

Street Where Hydrant is Located: Parriott Pl
Nearest Cross Street: Don Julian Rd
Location of Hydrant: 290ft north of Don Julian Rd on Parriott Rd

Field Data

Size of Hydrant (in.): 6
Elevation of Hydrant : 325 ft
Fire Flow Available at Hydrant: 1138.032582 gpm
Residual Pressure: 63 psi

Diameter of Outlet (in.): 2.5
C Factor: 0.9
Pitot Pressure (psi): 46
Static Pressure (psi): 66

Reservoir Data

Name of Reservoir: Main St. 3 MG
Water Level at Reservoir: 28.2 ft

Name of Reservoir: Main St. 1.8 MG
Water Level at Reservoir: 26.0

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Hudson Booster Station
Pump No: 2
Flow at Pump Station: 940 gpm
Pressure at Pump Station: unknown psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:
Flow at Interconnection: gpm
Pressure at Interconnection: psi

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)
Hudson inflow increased by 300 gpm

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/7/2016
Time:
Hydrant Test No. 3 / 11
Field Technician:

Location Information

Pressure Zone: 1
District Atlas Map Page: H10

Street Where Hydrant is Located: Main St
Nearest Cross Street: N. 2nd Street
Location of Hydrant: NE corner of Main St and N. 2nd Street

Field Data

Size of Hydrant (in.): 6
Elevation of Hydrant : 340 ft
Fire Flow Available at Hydrant: 1020.649535 gpm
Residual Pressure: 55 psi

Diameter of Outlet (in.): 2.5
C Factor: 0.9
Pitot Pressure (psi): 37
Static Pressure (psi): 55

Reservoir Data

Name of Reservoir: Main St. 3 MG
Water Level at Reservoir: 28.4 ft

Name of Reservoir: Main St. 1.8 MG
Water Level at Reservoir: 26.2

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Hudson Booster Station
Pump No: 2
Flow at Pump Station: 940 gpm
Pressure at Pump Station: unknown psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:
Flow at Interconnection: gpm
Pressure at Interconnection: psi

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/15/2016
Time:
Hydrant Test No. 4 / 11
Field Technician:

Location Information

Pressure Zone: 2
District Atlas Map Page: I10

Street Where Hydrant is Located: Main St
Nearest Cross Street: Waringwood Rd
Location of Hydrant: SE corner of Main St and Waringwood Rd

Field Data

Size of Hydrant:	4	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	433 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1034.350142 gpm	Pitot Pressure (psi):	38
Residual Pressure:	104 psi	Static Pressure (psi):	102

Reservoir Data

Name of Reservoir:	Main St. 3 MG	Name of Reservoir:	Main St. 1.8 MG
Water Level at Reservoir:	30.8 ft	Water Level at Reservoir:	28.9

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Zone 2
Pump No: 1 & 3
Flow at Pump Station: 1440 gpm
Pressure at Pump Station: 92.4 psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:	Pump Station 3	Name of Interconnection:	San Jose
Flow at Interconnection:	0 gpm	Flow at Interconnection:	0
Pressure at Interconnection:	60 psi	Pressure at Interconnection:	42

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/15/2016
Time:
Hydrant Test No. 5 / 11
Field Technician:

Location Information

Pressure Zone: 2
District Atlas Map Page: I10

Street Where Hydrant is Located: Main St
Nearest Cross Street: Hillcrest Dr
Location of Hydrant: Across from 16328 Main St

Field Data

Size of Hydrant (in.):	6	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	464 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1209.977939 gpm	Pitot Pressure (psi):	52
Residual Pressure:	98 psi	Static Pressure (psi):	106

Reservoir Data

Name of Reservoir:	Main St. 3 MG	Name of Reservoir:	Main St. 1.8 MG
Water Level at Reservoir:	30.9 ft	Water Level at Reservoir:	29.0

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Zone 2
Pump No: 3
Flow at Pump Station: 1058 gpm
Pressure at Pump Station: 90 psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:	Pump Station 3	Name of Interconnection:	San Jose
Flow at Interconnection:	0 gpm	Flow at Interconnection:	200
Pressure at Interconnection:	60 psi	Pressure at Interconnection:	34

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/15/2016
Time:
Hydrant Test No. 6 / 11
Field Technician:

Location Information

Pressure Zone: 2
District Atlas Map Page:

Street Where Hydrant is Located: Leverette Ave
Nearest Cross Street: Villa Park St.
Location of Hydrant: Across from 405 Leverette

Field Data

Size of Hydrant (in.):	6	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	450 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1352.796461 gpm	Pitot Pressure (psi):	65
Residual Pressure:	88 psi	Static Pressure (psi):	102

Reservoir Data

Name of Reservoir:	Main St. 3 MG	Name of Reservoir:	Main St. 1.8 MG
Water Level at Reservoir:	30.9 ft	Water Level at Reservoir:	28.9

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Zone 2
Pump No: 3
Flow at Pump Station: 912 gpm
Pressure at Pump Station: 89 psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:	Pump Station 3	Name of Interconnection:	San Jose
Flow at Interconnection:	350 gpm	Flow at Interconnection:	100
Pressure at Interconnection:	60 psi	Pressure at Interconnection:	45

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 10/3/2016
Time:
Hydrant Test No. 7 / 11
Field Technician:

Location Information

Pressure Zone: 2
District Atlas Map Page:

Street Where Hydrant is Located: Banbridge Ave
Nearest Cross Street: Bamboo St.
Location of Hydrant: 16104 Banbridge Ave.

Field Data

Size of Hydrant (in.):	6	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	387 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1125.594694 gpm	Pitot Pressure (psi):	45
Residual Pressure:	83 psi	Static Pressure (psi):	88

Reservoir Data

Name of Reservoir:	Main St. 3 MG	Name of Reservoir:	Main St. 1.8 MG
Water Level at Reservoir:	32 ft	Water Level at Reservoir:	30.0

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Zone 2
Pump No: 1 & 3
Flow at Pump Station: 1516 gpm
Pressure at Pump Station: 76.6 psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:	Pump Station 3	Name of Interconnection:	San Jose
Flow at Interconnection:	0 gpm	Flow at Interconnection:	300
Pressure at Interconnection:	78 psi	Pressure at Interconnection:	36

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 10/3/2016
Time:
Hydrant Test No. 8 / 11
Field Technician:

Location Information

Pressure Zone: 2
District Atlas Map Page:

Street Where Hydrant is Located: Banbridge Ave
Nearest Cross Street: Pleasanthome Dr
Location of Hydrant: 249 Banbridge

Field Data

Size of Hydrant (in.): 4
Elevation of Hydrant : 431 ft
Fire Flow Available at Hydrant: 1020.649535 gpm
Residual Pressure: 45 psi

Diameter of Outlet (in.): 2.5
C Factor: 0.9
Pitot Pressure (psi): 37
Static Pressure (psi): 58

Reservoir Data

Name of Reservoir: Main St. 3 MG
Water Level at Reservoir: 32.1 ft

Name of Reservoir: Main St. 1.8 MG
Water Level at Reservoir: 30.0

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name: Zone 2
Pump No: 1 & 3
Flow at Pump Station: 1318 gpm
Pressure at Pump Station: 89.5 psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection: Pump Station 3
Flow at Interconnection: 0 gpm
Pressure at Interconnection: 78 psi

Name of Interconnection: San Jose
Flow at Interconnection: 0
Pressure at Interconnection: 48

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/7/2016
Time:
Hydrant Test No. 9 / 11
Field Technician:

Location Information

Pressure Zone: 3
District Atlas Map Page:

Street Where Hydrant is Located: Pleasanthome Dr
Nearest Cross Street: Roundabout Dr
Location of Hydrant: Across from 178 Pleasanthome Dr

Field Data

Size of Hydrant (in.): 4
Diameter of Outlet (in.): 2.5
Elevation of Hydrant : 642 ft
C Factor: 0.9
Fire Flow Available at Hydrant: 919.0442188 gpm
Pitot Pressure (psi): 30
Residual Pressure: 84 psi
Static Pressure (psi): 89

Reservoir Data

Name of Reservoir: Ind Hills East
Water Level at Reservoir: 30.9 ft
Name of Reservoir: Ind Hills West
Water Level at Reservoir: 32.7

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name:
Pump No:
Flow at Pump Station:
Pressure at Pump Station:

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection: Industry Hills to Pleaseanthome 8-inch
Flow at Interconnection: 957 gpm
Pressure at Interconnection: 10 psi @ booster psi

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 9/7/2016
Time:
Hydrant Test No. 10 / 11
Field Technician:

Location Information

Pressure Zone: 3
District Atlas Map Page:

Street Where Hydrant is Located: S. Banbridge Ave.
Nearest Cross Street: Roundabout Dr
Location of Hydrant: 65 ft northwest of Roudabout Dr.

Field Data

Size of Hydrant (in.):	4	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	552 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1047.871633 gpm	Pitot Pressure (psi):	39
Residual Pressure:	82 psi	Static Pressure (psi):	94

Reservoir Data

Name of Reservoir:	Ind Hills East	Name of Reservoir:	Ind Hills West
Water Level at Reservoir:	30.9 ft	Water Level at Reservoir:	32.7

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection: Industry Hills to Pleaseanthome 8-inch
Flow at Interconnection: 956 gpm
Pressure at Interconnection: 10 psi @ booster psi

Other

Remarks/Comments: Formula Used to Calulate Fire Flow : $Q = 29.83 * D^2 * C * \sqrt{P_t}$
HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

Fire Flow Field Notes

District: La Puente Valley County WD
Date: 10/3/2016
Time:
Hydrant Test No. 11 / 11
Field Technician:

Location Information

Pressure Zone: 4
District Atlas Map Page: I10

Street Where Hydrant is Located: Hillcrest Dr
Nearest Cross Street: Mcfall Ln
Location of Hydrant: 182 Hillcrest Dr

Field Data

Size of Hydrant:	6	Diameter of Outlet (in.):	2.5
Elevation of Hydrant :	575 ft	C Factor:	0.9
Fire Flow Available at Hydrant:	1125.594694 gpm	Pitot Pressure (psi):	45
Residual Pressure:	74 psi	Static Pressure (psi):	49

Reservoir Data

Name of Reservoir:	Main St. 3 MG	Name of Reservoir:	Main St. 1.8 MG
Water Level at Reservoir:	32.3 ft	Water Level at Reservoir:	30.0

Pump Data

Are Pump Stations ON? YES NO

(If Yes, answer below)

		Data when Booster 2 kicked on	
Pump Station Name:	Zone 4	Pump Station Name:	Zone 4
Pump No:	1	Pump No:	1
Flow at Pump Station:	173 gpm	Flow at Pump Station:	23 gpm
Pressure at Pump Station:	93.2 psi	Pressure at Pump Station:	145.9 psi

Pump Station Name: Booster 2
Pump No: 2
Flow at Pump Station: unknown gpm
Pressure at Pump Station: unknown psi

Pump Station Name:
Pump No:
Flow at Pump Station: gpm
Pressure at Pump Station: psi

Interconnections

Are Interconnections ON? YES NO

(If Yes, answer below)

Name of Interconnection:
Flow at Interconnection: gpm
Pressure at Interconnection: psi

Other

Remarks/Comments:

HydrantPro Diffuser used to measure pitot reading with C factor of 0.9 (provided by manuf.)

APPENDIX E

Fire Code, Regulation 8

Los Angeles County Fire Code, Regulation #8

Fire Flow and Hydrant Requirements (V7-C1-S8)

I. INTRODUCTION

A. Purpose: To provide Department standards for fire flow, hydrant spacing and specifications.

B. Scope: Informational to the general public and instructional to all individuals, companies, or corporations involved in the subdivision of land, construction of buildings, or alterations and/or installation of fire protection water systems and hydrants.

C. Author: The Deputy Chief of the Prevention Services Bureau through the Assistant Fire Chief (Fire Marshal) of the Fire Prevention Division is responsible for the origin and maintenance of this regulation.

D. Definitions:

1. GPM – gallons per minute

2. psi – pounds per square inch

3. Detached condominiums – single detached dwelling units on land owned in common

4. Multiple family dwellings – three or more dwelling units attached

II. RESPONSIBILITY

A. Land Development Unit

1. The Department's Land Development Unit shall review all subdivisions of land and apply fire flow and hydrant spacing requirements in accordance with this regulation and the present zoning of the subdivision or allowed land use as approved by the County's Regional Planning Commission or city planning department.

B. Fire Prevention Engineering Section

1. The Department's Fire Prevention Engineering Section shall review building plans and apply fire flow and hydrant spacing requirements in accordance with this regulation.

III. POLICY

A. The procedures, standards, and policies contained herein are provided to ensure the adequacy of, and access to, fire protection water and shall be enforced by all Department personnel.

IV. PROCEDURES

A. Land development: fire flow, duration of flow, and hydrant spacing

The following requirements apply to land development issues such as: tract and parcel maps, conditional use permits, zone changes, lot line adjustments, planned unit developments, etc.

	Fire Flow	Duration of Flow	Public Hydrant Spacing
1. Residential Fire Zones 3 Very High Fire Hazard Severity Zone (VHFHSZ)			
a. Single family dwelling and detached condominiums (1 – 4 Units) (Under 5,000 square feet)	1,250 GPM	2 hrs.	600 ft.
b. Detached condominium (5 or more units) (Under 5,000 square feet)	1,500 GPM	2 hrs.	300 ft.
c. Two family dwellings (Duplexes)	1,500 GPM	2 hrs.	600 ft.

NOTE: FOR SINGLE FAMILY DWELLINGS OVER 5,000 SQUARE FEET. SEE, TABLE 1 FOR FIRE FLOW REQUIREMENTS PER BUILDING SIZE.

2. Multiple family dwellings, hotels, high rise, commercial, industrial, etc.

a. Due to the undetermined building designs for new land development projects ***(undeveloped land),*** the required fire flow shall be: 5,000 GPM 5 hrs. 300 ft.

NOTE: REDUCTION IN FIRE FLOW IN ACCORDANCE WITH TABLE 1.

b. Land development projects consisting of lots having existing structures shall be in compliance with Table 1 (fire flow per building size). This standard applies to multiple family dwellings, hotels, high rise, commercial, industrial, etc.

NOTE: FIRE FLOWS PRECEDING ARE MEASURED AT 20 POUNDS PER SQUARE INCH RESIDUAL PRESSURE.

B. Building plans

The Department's Fire Prevention Engineering Section shall review building plans and apply fire flow requirements and hydrant spacing in accordance with the following:

1. Residential

Building Occupancy Classification	Fire Flow	Duration of Flow	Public Hydrant Spacing
a. Single family dwellings - Fire Zone 3 (Less than 5000 square feet)			
On a lot of one acre or more	750 GPM	2 hrs.	600 ft.
On a lot less than one acre	1,250 GPM	2 hrs	600 ft.
b. Single family dwellings - VHFHSZ (Less than 5,000 square feet)			
On a lot of one acre or more	1,000 GPM	2 hrs.	600 ft.
On lots less than one acre	1,250 GPM	2 hrs.	600 ft.

NOTE: FOR SINGLE FAMILY DWELLINGS GREATER THAN 5,000 SQUARE FEET IN AREA SEE TABLE

c. Two-family dwelling units

Duplexes	1,500 GPM	2 hrs.	600 ft.

2. Mobile home park

a. Recreation bldg. — Refer to Table 1 for fire flow according to building size

b. Mobile home park — 1,250 GPM 2 hrs. 600 ft.

3. Multiple residential, apartments, single family residences (greater than 5,000 square feet), private schools, hotels, high rise, commercial, industrial, etc. (R-1, E, B, A, I, H, F, M, S) (see Table 1).

C. Public fire hydrant requirements

1. Fire hydrants shall be required at intersections and along access ways as spacing requirements dictate.

2. Spacing

a. Cul-de-sac

When cul-de-sac depth exceeds 450' (residential) or 200' (commercial), hydrants shall be required at mid-block. Additional hydrants will be required if hydrant spacing exceeds specified distances.

b. Single family dwellings

Fire hydrant spacing of 600 feet

NOTE: The following guidelines shall be used in meeting single family dwellings hydrant spacing requirements:

(1) Urban properties (more than one unit per acre): No portion of lot frontage should be more than 450' via vehicular access from a public hydrant.

(2) Non-Urban Properties (less than one unit per acre):
No portion of a structure should be placed on a lot where it exceeds 750' via vehicular access from a properly spaced public hydrant that meets the required fire flow.

c. All occupancies

Other than single family dwellings, such as commercial, industrial, multi-family dwellings, private schools, institutions, detached condominiums (five or more units), etc.

Fire hydrant spacing shall be 300 feet.

NOTE: The following guidelines shall be used in meeting the hydrant spacing requirements.

(1) No portion of lot frontage shall be more than 200 feet via vehicular access from a public hydrant.

(2) No portion of a building should exceed 400 feet via vehicular access from a properly spaced public hydrant.

d. Supplemental fire protection

When a structure cannot meet the required public hydrant spacing distances, supplemental fire protection shall be required.

NOTE: Supplemental fire protection is not limited to the installation of on-site fire hydrants; it <u>may</u> include automatic extinguishing systems.

3. Hydrant location requirements - both sides of a street

Hydrants shall be required on both sides of the street whenever:

a. Streets having raised median center dividers that make access to hydrants difficult, causes time delay, and/or creates undue hazard.

b. For situations other than those listed in "a" above, the Department's inspector's judgment shall be used. The following items shall be considered when determining hydrant locations:

(1) Excessive traffic loads, major arterial route, in which traffic would be difficult to detour.

(2) Lack of adjacent parallel public streets in which traffic could be redirected (e.g., Pacific Coast Highway).

(3) Past practices in the area.

(4) Possibility of future development in the area.

(5) Type of development (i.e., flag-lot units, large apartment or condo complex, etc.).

(6) Accessibility to existing hydrants

(7) Possibility of the existing street having a raised median center divider in the near future.

D. On-site hydrant requirements

1. When any portion of a proposed structure exceeds (via vehicular access) the allowable distances from a public hydrant and on-site hydrants are required, the following spacing requirements shall be met:

a. Spacing distance between on-site hydrants shall be 300 to 600 feet.

(1) Design features shall assist in allowing distance modifications.

b. Factors considered when allowing distance modifications.

(1) Only sprinklered buildings qualify for the maximum spacing of 600 feet.

(2) For non-sprinklered buildings, consideration should be given to fire protection, access doors, outside storage, etc. Distance between hydrants should not exceed 400 feet.

2. Fire flow

a. All on-site fire hydrants shall flow a minimum of 1,250 gallons per minute at 20 psi for a duration of two hours. If more than one on-site fire hydrant is required, the on-site fire flow shall be at least 2,500 gallons per minute at 20 psi, flowing from two hydrants simultaneously. On site flow may be greater depending upon the size of the structure and the distance from public hydrants.

NOTE: ONE OF THE TWO HYDRANTS TESTED SHALL BE THE FARTHEST FROM THE PUBLIC WATER SOURCE.

3. Distance from structures

   All on-site hydrants shall be installed a minimum of 25 feet from a structure or protected by a two-hour firewall.

4. Shut-off valves

   All on-site hydrants shall be equipped with a shut-off (gate) valve, which shall be located as follows:

   a. Minimum distance to the hydrant 10 feet

   b. Maximum distance from the hydrant 25 feet

5. Inspection of new installations

   All new on-site hydrants and underground installations are subject to inspection of the following items by a representative of the Department:

   a. Piping materials and the bracing and support thereof.

   b. A hydrostatic test of 200 psi for two hours.

   c. Adequate flushing of the installation.

   d. Flow test to satisfy required fire flow.

      (1) Hydrants shall be painted with two coats of red primer and one coat of red paint, with the exception of the stem and threads, prior to flow test and acceptance of the system.

6. Maintenance

   It shall be the responsibility of the property management company, the homeowners association, or the property owner to maintain on-site hydrants.

   a. Hydrants shall be painted with two coats of red primer and one coat of red, with the exception of the stem and threads, prior to flow test and acceptance of the system.

   b. No barricades, walls, fences, landscaping, etc., shall be installed or planted within three feet of a fire hydrant.

E. Public hydrant flow procedure

The minimum acceptable flow from any existing public hydrant shall be 1,000 GPM unless the required fire flow is less. Hydrants used to satisfy fire flow requirements will be determined by the following items:

1. Only hydrants that meet spacing requirements are acceptable for meeting fire flow requirements.

2. In order to meet the required fire flow:

   a. Flow closest hydrant and calculate to determine flow at 20 pounds per square inch residual pressure. If the calculated flow does not meet the fire flow requirement, the next closest hydrant shall be flowed simultaneously with the first hydrant, providing it meets the spacing requirement, etc.

   b. If more than one hydrant is to be flowed in order to meet the required fire flow, the number of hydrants shall be flowed as follows:

One hydrant	1,250 GPM and below
Two hydrants	1,251– 3,500 GPM flowing simultaneously
Three hydrants	3,501– 5,000 GPM flowing simultaneously

F. Hydrant upgrade policy

1. Existing single outlet 2 1/2" inch hydrants shall be upgraded to a double outlet 6" x 4" x 2 1/2" hydrant when the required fire flow exceeds 1,250 GPM.

2. An upgrade of the fire hydrant will not be required if the required fire flow is between the minimum requirement of 750 gallons per minute, up to and including 1,250 gallons per minute, and the existing public water system will provide the required fire flow through an existing wharf fire hydrant.

3. All new required fire hydrant installations shall be approved 6" x 4" x 2 1/2" fire hydrants.

4. When water main improvements are required to meet GPM flow, and the existing water main has single outlet 2 1/2" fire hydrant(s), then a hydrant(s) upgrade will be required. This upgrade shall apply regardless of flow requirements.

G. Hydrant specifications

All required public and on-site fire hydrants shall be installed to the following specifications prior to flow test and acceptance of the system.

1. Hydrants shall be:

   a. Installed so that the center line of the lowest outlet is between 14 and 24 inches above finished grade

   b. Installed so that the front of the riser is between 12 and 24 inches behind the curb face

   c. Installed with outlets facing the curb at a 45-degree angle to the curb line if there are double outlet hydrants

   d. Similar to the type of construction which conforms to current A.W.W.A. Standards

   e. Provided with three-foot unobstructed clearance on all sides

   f. Provided with approved plastic caps

   g. Painted with two coats of red primer and one coat of traffic signal yellow for public hydrants and one coat of red for on-site hydrants, with the exception of the stems and threads

2. Underground shut-off valves are to be located:

   a. A minimum distance of 10 feet from the hydrant

   b. A maximum distance of 25 feet from the hydrant

   Exception: Location can be less than 10 feet when the water main is already installed and the 10-foot minimum distance cannot be satisfied.

3. All new water mains, laterals, gate valves, buries, and riser shall be a minimum of six inches inside diameter.

4. When sidewalks are contiguous with a curb and are five feet wide or less, fire hydrants shall be placed immediately behind the sidewalk. Under no circumstances shall hydrants be more than six feet from a curb line.

5. The owner-developer shall be responsible for making the necessary arrangements with the local water purveyor for the installation of all public facilities.

6. Approved fire hydrant barricades shall be installed if curbs are not provided (see Figures 1, 2, and 3 following on pages 11 and 12).

Barricade/Clearance Details

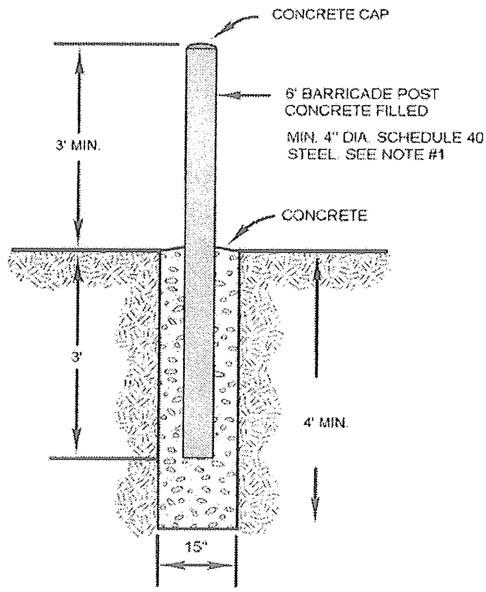
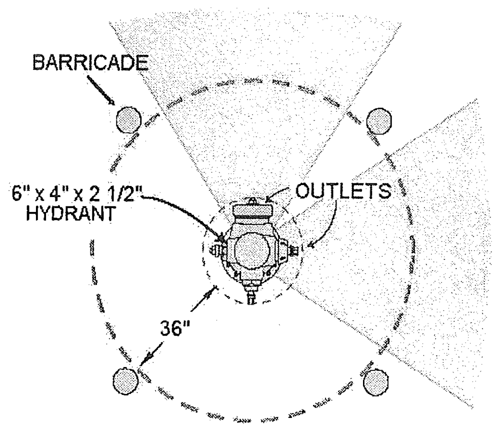


Figure 1



PLAN
FIRE HYDRANT BARRICADES
(TYPICAL)

Figure 2

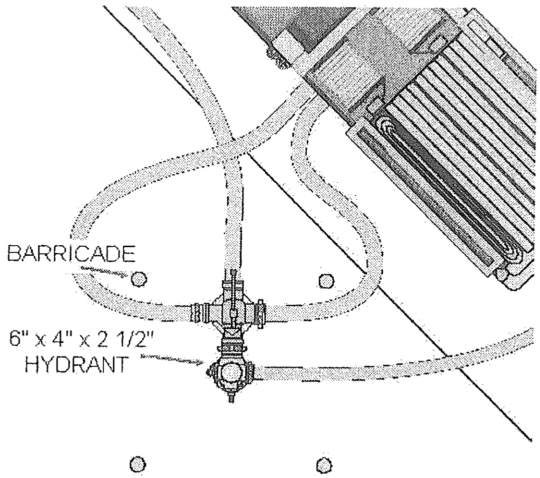


Figure 3

Notes:

1. Constructed of steel not less than four inches in diameter, six inches if heavy truck traffic is anticipated, schedule 40 steel and concrete filled.

2. Posts shall be set not less than three feet deep in a concrete footing of not less than 15 inches in diameter, with the top of the posts not less than three feet above ground and not less than three feet from the hydrant

3. Posts, fences, vehicles, growth, trash storage and other materials or things shall not be placed or kept near fire hydrants in a manner that would prevent fire hydrants from being immediately discernable.

4. If hydrant is to be barricaded, no barricade shall be constructed in front of the hydrant outlets (Figure 2, shaded area).

5. The exact location of barricades may be changed by the field inspector during a field inspection.

6. The steel pipe above ground shall be painted a minimum of two field coats of primer.

7. Two finish coats of "traffic signal yellow" shall be used for fire hydrant barricades.

8. Figure 3 shows hydrant hook up during fireground operations. Notice apparatus (hydra-assist-valve) connected to hydrant and the required area. Figure 3 shows the importance of not constructing barricades or other obstructions in front of hydrant outlets.

H. Private fire protection systems for rural commercial and industrial development

Where the standards of this regulation cannot be met for industrial and commercial developments in rural areas, alternate proposals which meet NFPA Standard 1142 may be submitted to the Fire Marshal for review. Such proposals shall also be subject to the following:

1. The structure is beyond 3,000 feet of any existing, adequately-sized water system.

    a. Structures within 3,000 feet of an existing, adequately-sized water system, but beyond a water purveyor service area, will be reviewed on an individual basis.

2. The structure is in an area designated by the County of Los Angeles' General Plan as rural non-urban.

I. Blue reflective hydrant markers replacement policy

1. Purpose: To provide information regarding the replacement of blue reflective hydrant markers, following street construction or repair work.

    a. Fire station personnel shall inform Department of Public Works Road Construction Inspectors of the importance of the blue reflective hydrant markers, and encourage them to enforce their Department permit requirement, that streets and roads be returned to their original condition, following construction or repair work.

    b. When street construction or repair work occurs within this Department's jurisdiction, the nearest Department of Public Works Permit Office shall be contacted. The location can be found by searching for the jurisdiction office in the "County of Los Angeles Telephone Directory" under "Department of Public Works Road Maintenance Division." The importance of the blue reflective hydrant markers should be explained, and the requirement encouraged that the street be returned to its original condition, by replacing the hydrant markers.

TABLE 1 *

BUILDING SIZE (First floor area)		Fire Flow *(1) (2)	Duration	Hydrant Spacing
Under 3,000	sq. ft.	1,000 GPM	2 hrs.	300 ft.
3,000 to 4,999	sq. ft.	1,250 GPM	2 hrs.	300 ft.
5,000 to 7,999	sq. ft.	1,500 GPM	2 hrs.	300 ft.
8,000 to 9,999	sq. ft.	2,000 GPM	2 hrs.	300 ft.
10,000 to 14,999	sq. ft.	2,500 GPM	2 hrs.	300 ft.
15,000 to 19,999	sq. ft.	3,000 GPM	3 hrs.	300 ft.
20,000 to 24,999	sq. ft.	3,500 GPM	3 hrs.	300 ft.
25,000 to 29,999	sq. ft.	4,000 GPM	4 hrs.	300 ft.
30,000 to 34,999	sq. ft.	4,500 GPM	4 hrs.	300 ft.
35,000 or more	sq. ft.	5,000 GPM	5 hrs.	300 ft.

* See applicable footnotes below:

(FIRE FLOWS MEASURED AT 20 POUNDS PER SQUARE INCH RESIDUAL PRESSURE)

(1) Conditions requiring additional fire flow.

a. Each story above ground level - add 500 GPM per story.

b. Any exposure within 50 feet - add a total of 500 GPM.

c. Any high-rise building (as determined by the jurisdictional building code) the fire flow shall be a minimum of 3,500 GPM for 3 hours at 20 psi.

d. Any flow may be increased up to 1,000 GPM for a hazardous occupancy.

(2) Reductions in fire flow shall be cumulative for type of construction and a fully sprinklered building. The following allowances and/or additions may be made to standard fire flow requirements:

a. A 25% reduction shall be granted for the following types of construction: Type I-F.R, Type II-F.R., Type II one-hour, Type II-N, Type III one-hour, Type III-N, Type IV, Type IV one hour, and Type V one-hour. This reduction shall be automatic and credited on all projects using these types of construction. Credit will not be given for Type V-N structures (to a minimum of 2,000 GPM available fire flow).

b. A 25% reduction shall be granted for fully sprinklered buildings (to a minimum of 2,000 GPM available fire flow).

c. When determining required fire flows for structures that total 70,000 square feet or greater, such flows shall not be reduced below 3,500 GPM at 20 psi for three hours.

APPENDIX F

Deficiency Improvements

Exhibit 1: 5th Street Waterline Improvement

Upsize approximately 510 feet of waterline and install two new fire hydrants

Exhibit 2: Ferrero Lane and Rorimer Street Improvements

Upsize approximately 605 feet to 6-inch DIP and install a PRV

Exhibit 3: Bamboo St. and Dalesford Dr. Improvements

Upsize approximately 335 feet to 8-inch DIP and install a PRV

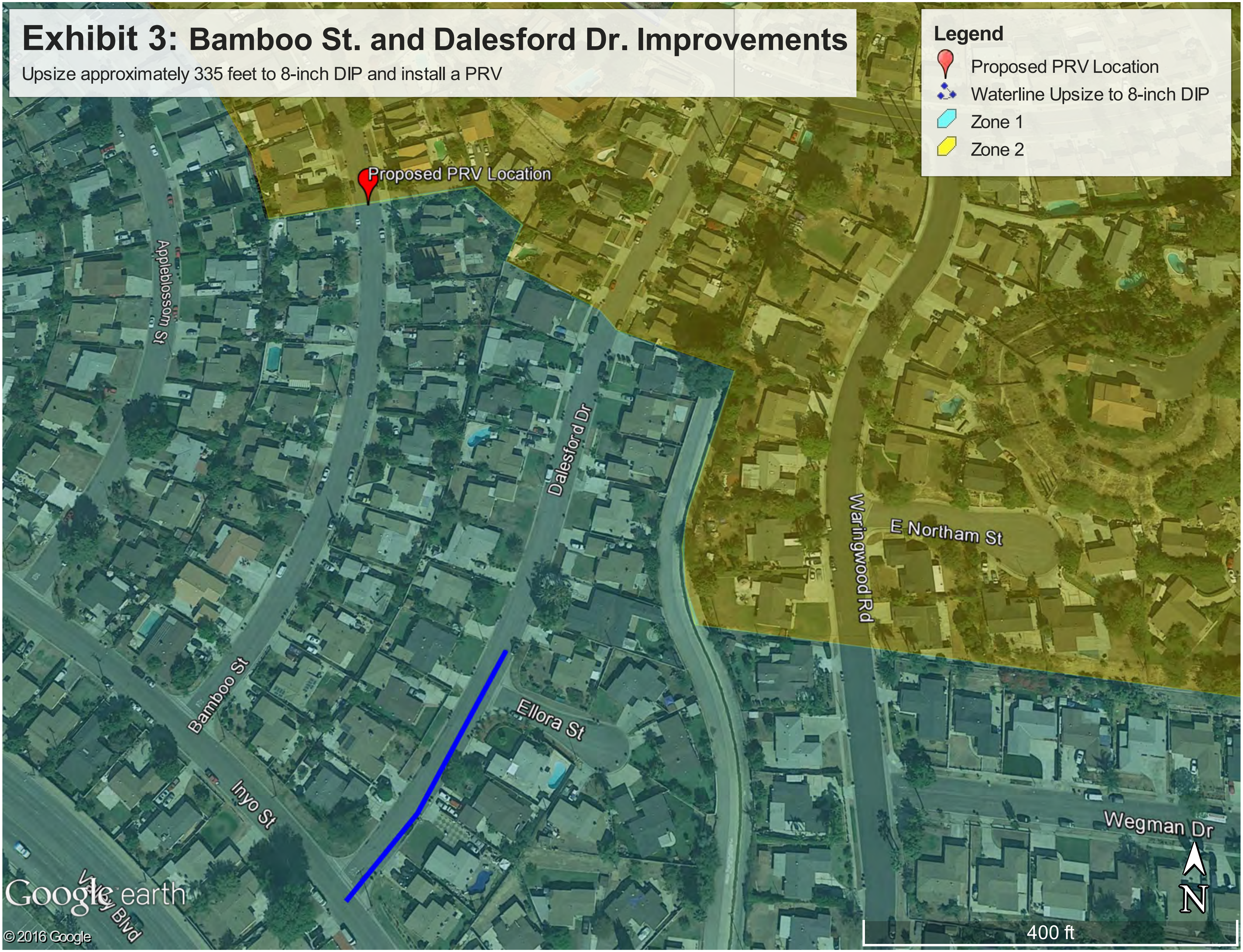


Exhibit 4: Inyo St. and Common Ave. Improvements

Upsize approximately 1,570 feet of waterline to 8-inch DIP

Exhibit 5: N. Hacienda Blvd. Improvements

Install approximately 550 feet of 8-inch DIP to create hydraulic loop

Exhibit 6: Bamboo Street Improvements

Upsizeexisting 6-inch pipeline (~1,715 ft.) along Bamboo Street and Main Street to 8-inch DIP

APPENDIX G

PVOU Water Supply

CIVILTEC engineering inc.
Civil, Water, Wastewater, Drainage and Transportation Engineering
Construction Management ● Surveying
California ● Arizona

August 5, 2016

La Puente Valley County Water District
112 North First Street
La Puente, CA 91744

Attention: Greg B. Galindo, General Manager

Subject: Water Analysis and Study for PVOU Intermediate Zone Project

Dear Mr. Galindo:

CIVILTEC engineering, inc. (Civiltec) has completed the water analysis and study for the Puente Valley Operable Unit (PVOU) intermediate zone project per the project scope of work agreement. Our analysis goal is to accommodate the development of the PVOU project water with its incorporation into the La Puente Valley County Water District (LPVCWD) and City of Industry Waterworks System (CIWS) water systems with ultimate delivery of the project water to the Rowland Water District (RWD). A summary of the existing water systems and the required system improvements for delivering the water to RWD are provided herein.

The investigation considered the current water demand for CIWS and LPVCWD systems as well as the distribution system components that can potentially be utilized or may be impacted in order to convey water from the PVOU treatment facility through the CIWS or LPVCWD systems to RWD. Two alternatives were considered, Alternative A and Alternative B. In Alternative A, two interconnects will be upgraded or constructed and new pumps will be installed at Industry Hills pump station numbers 1 and 2. In addition, a new chloramination facility will be installed. In Alternative B, two interconnects will be constructed and upgraded, a new booster pump station will be constructed at the LPVCWD Main Street reservoir site, a chloramination facility will also be installed, and a new transmission line will be constructed.

Water Demand

The current water demand for LPVCWD and CIWS system was analyzed based on the production data between 2010 and 2015 for consideration in the effort. The ADD, MDD and PHD are calculated and summarized in following tableError! Reference source not found..

Table 1 – Production Data for LPVCWD and CIWS

	LP		CIWS	
Unit	MGD	GPM	MGD	GPM
ADD	1.55	1,075	1.20	833
MDD	3.42	2,373	2.89	2,006
PHD	5.13	3,559	4.33	3,009

The future water demand in the near term condition (i.e. the next 5 years) was analyzed using the population projection data provided by the City of La Puente and City of Industry, which is estimated to be a 1% increase per year. The maximum daily water supply to RWD from the PVOU IZ treatment facility is 1,750 gpm.

Pipeline Alignments

Water pipeline alignments to deliver the water from the PVOU IZ treatment facility to RWD interconnection are described below.

Alternative A

In Alternative A, the water system is composed of several elements such as interconnections, pipelines (CIWS 18" and 16" and New Waterline 12"), upgrades at Industry Hills pump station Nos. 1, 2 and 3 and the Industry Hills Reservoirs.

The water from PVOU IZ treatment facility is delivered to RWD connection through existing CIWS 16" and 18" pipelines and the New 12" water mains by way of the existing and proposed pumps at two CIWS pump stations. In this alternative, three different interconnections must be constructed or upgraded. In addition, this alternative assumes the use of LPVCWD's 16" from the Industry Hills Pump Station No. 3 to the new interconnection with RWD, operating at a greater pressure than it is currently subject and potentially greater than the current piping pressure rating for several hundred feet. The improvements envisioned as needed for this alternative are summarized below and are presented in **Figure 1**.

- Construction of a 12" Interconnection between the LPVCWD 14" ACP waterline and the CIWS 18" DI waterline at the south west of Hudson Avenue and Stafford Street consisting of approximately 12" pipe that is 16 feet long.
- Upgrading the Interconnection between the LPVCWD 16" waterline and the CIWS 16" waterline at the Industry Hills Pump Station 1 with a 16" pipe.
- Industry Hills Pump Station No. 1 – Installation of a new vertical turbine pump and Variable Frequency Drive (VFD) motor control panel in the existing pump station.
- Industry Hills Pump Station No. 2 – Installation of a new vertical turbine pump and Variable Frequency Drive (VFD) motor control panel in the existing pump station.

- Upgrading the interconnection between the LPVCWD 16" ACP waterline and the RWD 8" waterline on Azusa Way at Hurley Street with a 12" pipe.
- Reconfiguration of distribution piping to isolate the 16" waterline for primary use of conveying chloraminated PVOU IZ water to RWD. This improvement will include construction of a pressure sustaining valve on an existing 8" distribution pipeline on Main Street. Existing valves located at a point of connection between the 16" waterline and distribution pipelines, at Hurley Street and new Villa Park Street, will need to closed. As a result, functionality to supply from LPVCWD Zone 2 to CIWS through the Industry Hills Pump Station No. 3 will be eliminated. The existing 16" will primarily serve as a transmission pipeline from CIWS to RWD and chloraminated water in this pipe line will only be introduced to the LPVCWD Zone 2 system if the pressure conditions in Zone 2 fall below the set point of the new Pressure Sustaining valve proposed above.
- The pressure sustaining valve currently located at the Industry Hills Pump Station No. 3 will be adjusted to supply higher pressure within the existing 16" LPVCWD water line. This is done in order to deliver higher pressure to the RWD connection. Currently the connection with RWD exhibits a pressure of 110 psi while the LPVCWD system at this same location exhibits a pressure of 90 psi. As a result, the 16" waterline will be subject to pressures on the order of 20 to 30 psi higher than the current condition to enable delivery from LPVCWD to RWD. As a result, there is concern that the integrity of this pipeline may be compromised.
- Construction of a new chloramination facility at the Industry Hills Pump Station No. 3.

The project water will primarily be conveyed through existing 18" and 16" pipelines. When considering maximum day conditions while conveying 1,750 gpm of project water, the general velocity within the pipelines will range between 4.5 and 6 feet per second. Under normal conditions, this is slightly higher than a typical design criteria of 5 feet per second. However, this does not consider the overall network configuration of the existing system which will allow a greater number of flow paths for water to minimize impacts to existing water pipelines.

Alternative B

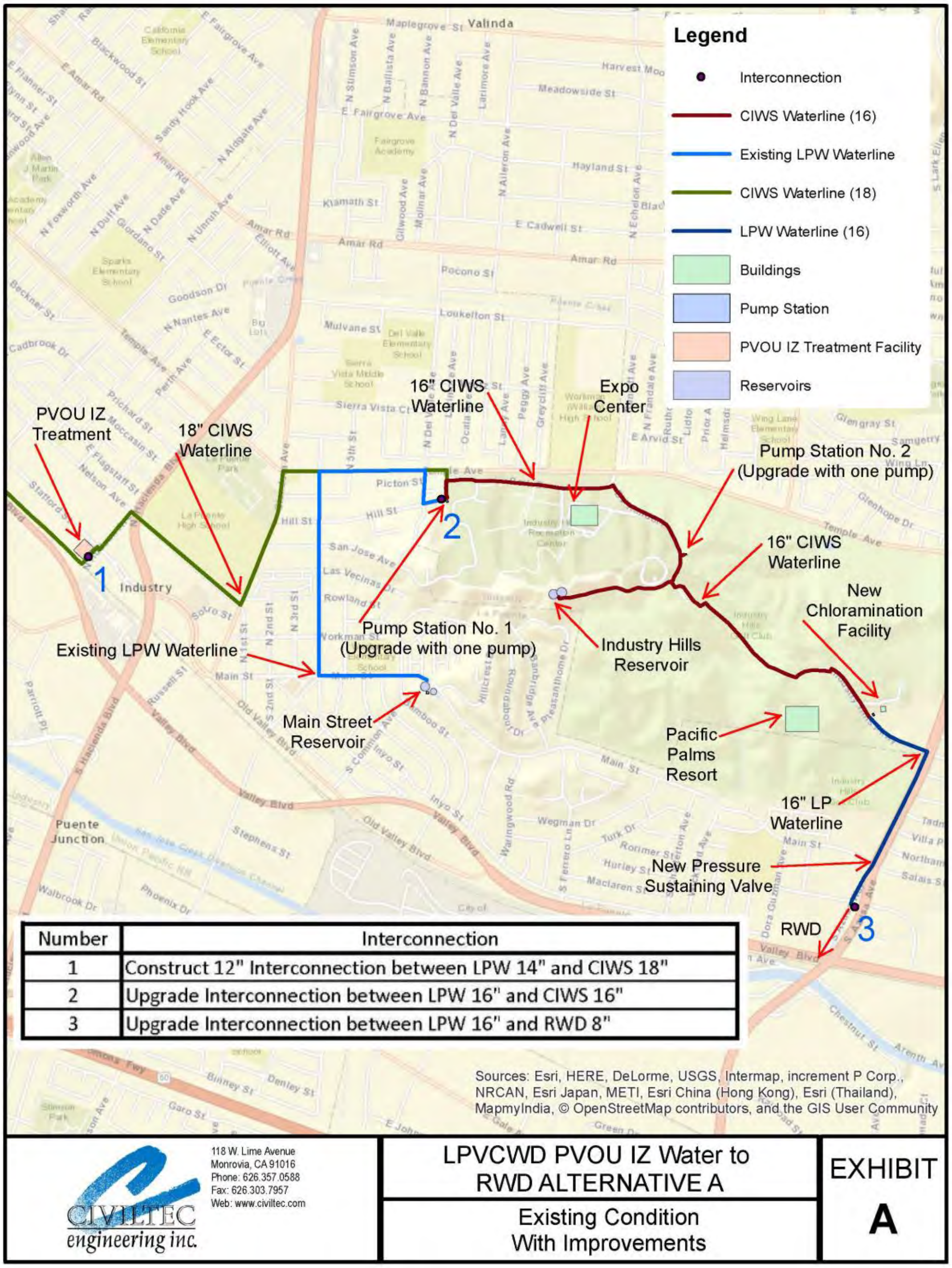
In Alternative B, the water system is composed of several elements such as interconnections, pipelines (LPVCWD 14" and 16"), a new pump station at the Main Street Reservoir, and new pipelines from the new pump station to the LPVCWD 16" pipeline. Like Alternative A, the water source for this alternative is from the PVOU IZ treatment facility. The water is delivered to RWD connection through LPVCWD 14" and 16" waterline by the proposed pump at the PVOU treatment facility. The improvements envisioned as needed for this alternative are summarized below and are presented in **Figure 2**.

- Construction of a 12" Interconnection between the LPVCWD 14" ACP waterline and CIWS 18" DI waterline at the south west intersection of Hudson Avenue and Stafford Street.
- Main Street Reservoir – Installation of a new pump station equipped with a Variable Frequency Drive (VFD) motor control center, pumps and construction of a chloramination facility.

- 12” transmission line – an approximate 7,000 linear feet transmission line will be constructed from Main Street Reservoir site to the 14” RWD pipeline.
- Upgrading the interconnection between the LPVCWD 16” ACP waterline and the RWD 8” waterline on Azusa Way at Hurley Street with a 12” pipe.

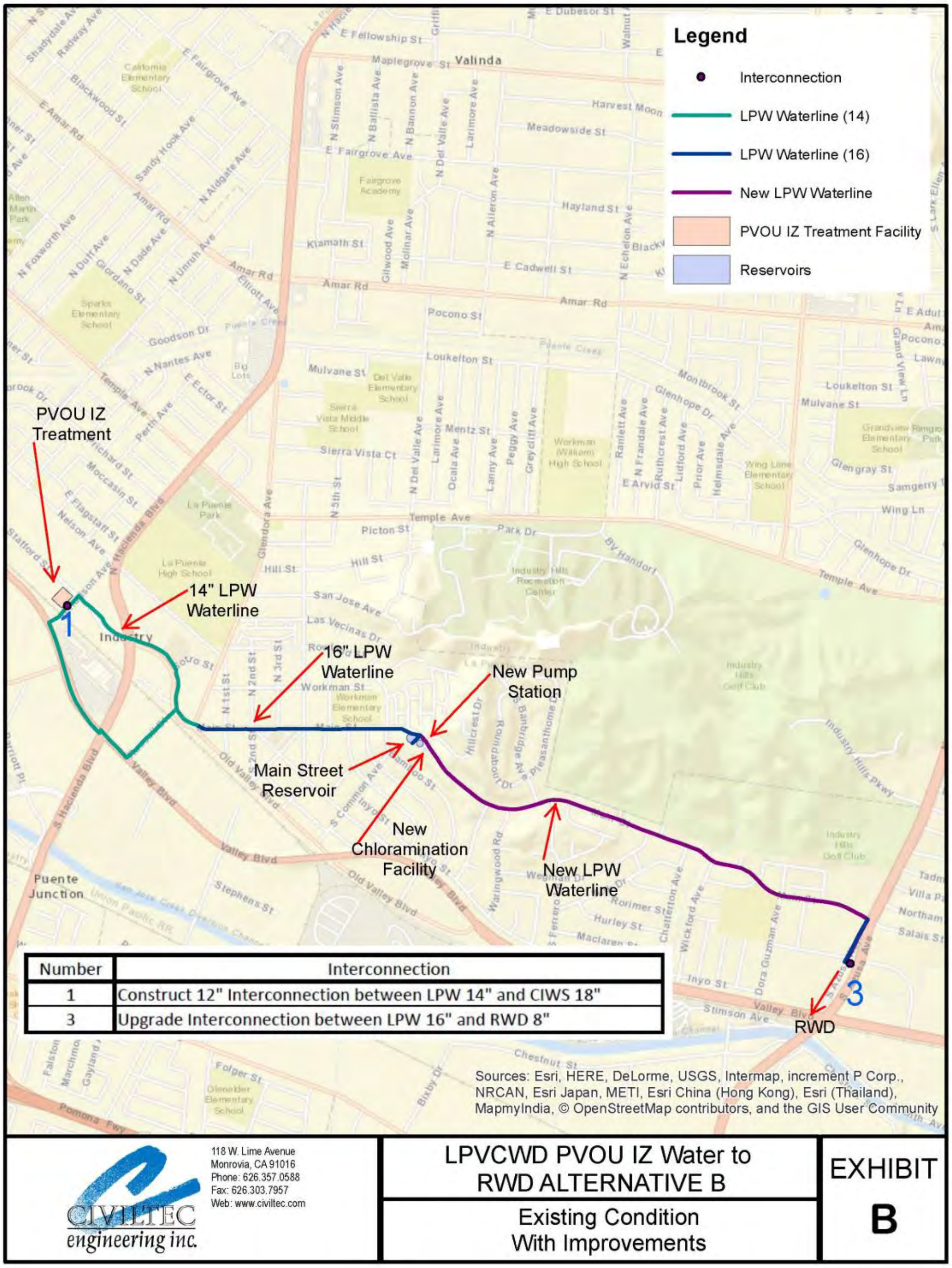
The PVOU project water will be primarily conveyed through LPVCWD system through 14” and 16” water pipelines. When considering conveyance of maximum day demands in the LPVCWD system in addition to the PVOU project water, velocities will approach 5 feet per second. However, this does not consider the overall network configuration of the existing system which will allow a greater number of flow paths for water to minimize impacts to existing water pipelines.

Figure 1 – Layout of Alternative A



Number	Interconnection
1	Construct 12" Interconnection between LPW 14" and CIWS 18"
2	Upgrade Interconnection between LPW 16" and CIWS 16"
3	Upgrade Interconnection between LPW 16" and RWD 8"

Figure 2 – Layout of Alternative B



Pump Production Analysis

Alternative A

Industry Hills Pump Station Nos. 1 and 2 are comprised of two existing electric driven pumps, a single gas driven pump and an existing empty pump can. There are three pumps in Industry Hills Pump Station No. 3, including two electric driven pumps and one gas driven pump. The gas driven pumps at each station are rarely, if ever, utilized. The specifications of each pump station is described in **Table 2**. Each pump station has a 480-volt electrical service with a 400 amp rated electrical disconnect that provides power to the two existing electrical pumps.

Table 2 – Pump Station Information in Alternative A

Station No.	1			2			3		
PumpNo.	GPM	TDH	HP	GPM	TDH	HP	GPM	TDH	HP
1	1,100	175	75	1,100	195	75	800	175	40
2	1,100	175	75	1,100	195	75	1,100	175	60
3 (Gas)	2,200	175	150	2,200	175	150		175	

The Industry Hills reservoirs supply potable water from CIWS Zone 1 via Industry Hills Pump Station No. 1 and No. 2. Pump station No. 1 can also supply water via a new interconnection with LPVCWD's Zone 1 service area through a LPVCWD 16" ACP waterline. The interconnect will minimize impacts to CIWS Zone 1 if there were instances where PVOU project water was not available or the Lomitas pump station was not operational so that sufficient water could be pumped to the Industry Hills reservoir while also supplying PVOU and maximum day demands. Pump Station No. 2 pumps water to the two (2) 2.5-million-gallon Industry Hills Reservoirs. Pump Station No. 3 pumps water from LPVCWD's Zone 2 service area to the Industry Hills Reservoir.

The average day demand in CIWS system is 1.20 MGD with a maximum daily demand of 2.89 MGD. While most demand occurs in the Zone 1 area, a percentage of the flow is demanded in the Industry Hills Zone. Approximately 0.18 MGD, on average, is utilized in this Industry Hills Zone and 0.43 MGD is required under maximum day conditions. However, the Industry Hills reservoirs also supply gravity storage through system interconnectivity to LPVCWD's Zone 3, Sub-Zone 3, Zone 5 and emergency water supply to LPVCWD's Zone 2. The near term maximum day demand when considering Zones 3 and 5 and Industry Hills is approximately 350 gpm. Since the connections to LPVCWD's Zone 2 are for emergency water supply only and not continuous supply, LPVCWD's Zone 2 demand is not included in the MDD assumption. As a result, Industry Hills Pump Station should have the ability to supply the maximum day flow of both Industry Hills pump station Nos. 1 and 2 and have a redundant 350 gpm capacity when the largest source is considered to be out of service. Note that the gas engine pumps are rarely if ever utilized and are not considered a reliable pumping source. As a result, these pumps are not considered in this analysis.

In order to satisfy the design criteria for production into each zone, each pump station must be able to supply the MDD when the largest source is out of service. The MDD for the Industry Hills Zone, along with LPVCWD Zone 3, Sub-Zone 3 and Zone 5, is approximately 350 gpm. As a result, considering existing and near term demands, the pump stations have sufficient capacity to convey the flow. However, when considering the additional 1,750 gpm of PVOU project water and conveyance through the system, an additional pump is necessary to satisfy these conditions. A total maximum demand of 2,100 gpm will pass through both the Industry Hills Pump Station Nos. 1 & 2. Each pump station has a redundant capacity of 1,100 gpm. As a result, there is a 1,000 gpm deficit in the redundant capacity of each station. A pump having a capacity of 1,100 gpm will be selected to match the existing pump capacities and which will have sufficient head (175 feet) to convey the flow. In light of this, a 75 horsepower motor will be selected to accommodate the additional load at Industry Hills pump stations Nos. 1 and 2.

Furthermore, the Industry Hills Booster pump station Nos. 1 and 2 must operate simultaneously to match the flow of the alternate pump station in order to maintain constant flow from Zone 1 to the Industry Hills reservoirs. There is no intermediate storage in between these zones to offset pump station operation. In addition, the PVOU system, which supplies water from the treatment plant, must also interface with the Industry Hills pump stations. Flow delivered from the PVOU will be matched by these pump stations as much as is practical while supplemental water may be provided to Industry Hills Pump Station No. 1 from the new interconnect (interconnect 2), which will supply water from LPVCWD Main Street Reservoirs.

Alternative B

Currently, there are two booster pump stations at the Main Street Reservoir site. The pump station located at the west side is comprised of two pumps that services Pressure Zone 4. The other pump station is comprised of three booster pumps that services Pressure Zone 2. The current pump stations at the Main Street Reservoir are described in **Table 3**.

Table 3 – Current Pump Stations Information at Main Street Reservoir

Station No.	West (Zone 4)			East (Zone 2)		
Pump No.	GPM	TDH	HP	GPM	TDH	HP
1	111	180	15	700	231	75
2	111	180	15	1,556	277	150
3				890	208	75

The Zone 4 booster station has been sized to convey the Peak Hour Demand to Zone 4 service area. This booster station takes suction from the Main Street Reservoirs and pumps directly into the system without the benefit of gravity storage. The fire flow in this zone is also supported by the operation of the largest pump in the Zone 2 pump station array.

The Zone 2 booster station has also been sized to convey the Peak Hour Demand in Zone 2 while also supplying sufficient water to support operation of the Zone 3 pump station. Zone 2 also does not have the benefit of pumping to gravity storage.

Considering the foregoing neither one of these pump stations have sufficient redundant capacity to support the conveyance of PVOU project water toward RWD. In light of this, a new booster station, having sufficient capacity, should be provided to convey the PVOU project water to RWD. Pumps of total 1,750 gpm capacity should be installed to take suction from the Main Street Reservoirs for this purpose.

Headloss

The friction headloss throughout the transmission pipeline systems can be calculated using the pipe diameter, pipe length and roughness factor. Using the Hazen-Williams equation, the approximate friction headloss through a pipe, due to friction, can be calculated.

Along with the linear losses, the minor losses are also considered. Minor losses include headloss due to bends, valves, or tees. The resulting headlosses for a flow of 1,750 gpm are shown in

Table 4.

Table 4 – Pipe Headloss at 1750 gpm

DESCRIPTION			LOSSES												
			LINEAR (hf_L)					FITTING (hf_F)				EQUIPMT (hf_E)		OTHER	TOTAL
Item No.	Item	Qty	Flow gpm	"d" in	"L" ft	"C"	Loss ft	"K"	Vel fps	$V^2/2g$ ft	Loss ft	"M"	Loss ft	Loss ft	Loss ft
1)	**Linear Losses**														
	14" dia piping	1	1750	14.0	7000	130	23.78								23.78
													Sub-Total Linear Losses		**23.8**
2)	**Fitting Losses**														
	90° bend	5	1750	14.0				0.3	6.0	0.6	0.17				0.84
	Pump Control Valve	1	875	10.0				4.8	6.0	0.6	2.68				2.68
	Tee	10	1750	14.0				0.26	6.0	0.6	0.15				1.45
	Flow Meter	1	1750	10.0				5	6.0	0.6	2.80				2.80
	Cross	2	1750	14.0				0.26	6.0	0.6	0.15				0.29
													Sub-Total Fitting Losses		**8.1**
													Total Losses		**31.8**
													25% Misc Losses		**2.0**
													Total Proposed and Future Losses		**33.9**

Total Dynamic Head

Considering the pressure head, velocity head, elevation head, and headlosses between the two points, the Bernoulli equation can be utilized to solve for the total dynamic head (TDH), or also called h_p. The elevation of the new pump station is approximately 451 feet above mean sea level (AMSL), the low water level of the Main Street Reservoir is approximately 468 AMSL, suction losses were assumed to be 5 psi, the elevation and pressure of RWD 8" interconnection is approximately 390.4 feet AMSL and 110 psi respectively. Pressure at the RWD connection was determined by input from RWD. The TDH required is approximately 230 feet.

Motor Size

With the TDH determined, the motor can be sized. For a maximum design flow rate of 1,750 gpm, a TDH of 230 ft and an assumed motor efficiency of 80%, the required motor horsepower of a variable speed pump having 900 gpm maximum capacity, would require 65 brake horsepower. Based on this analysis, two booster pumps will be utilized in this pump station, each having a horsepower rating of 75 HP. Note, this does not provide system reliability. As a result, if a single pump were to be out of service, the full 1,750 gpm of flow could not be supplied to RWD.

Storage Analysis

In the LPVCWD and CIWS systems, there are three reservoir sites - Industry Hills, Lomitas and Main Street. Information about these reservoirs is described in **Table 5**.

Table 5 – Current Reservoir Information

Reservoir	Base Elevation	Overflow Elevation	Diameter	Height	Volume	Installed	Material
IH 1	700	34	110	36	2.5 MG	1978	Steel
IH 2	700	34	110	36	2.5 MG	1978	Steel
LM	392	32	115	38	2.5 MG	1986	Steel
MS 1	450	38	115	40	3.0 MG	1973	Steel
MS2	450	38	90	40	1.8 MG	2005	Steel

IH: Industry Hills, LM: Lomitas, MS: Main Street

The current total capacity of the Industry Hills, Lomitas and the Main Street reservoirs are 5.0 MG, 2.5 MG and 4.8 MG, respectively. The design criteria for reservoir sizing requires that storage be provided to contain fire flow reserves, one day of MDD for emergency reserves and

30% of one day of MDD for operations. Both LPVCWD and CIWS systems are considered to be widely interconnected and as a result may share storage. Storage in the Industry Hills Reservoirs is available to all Zones in both systems and water can automatically move to lower Zones as needed to supplement storage reserves in lower zones if the emergency and fire flow reserves were to be depleted. As a result, the storage capacity of both systems is considered collectively in this analysis and is equal to 12.3 MG. Considering the water demand for LPVCWD and applying the design criteria, the storage requirement is approximately 5.6 MG for near term conditions. For CIWS, the storage requirement for near term conditions is approximately 4.9 MG, thus equaling a total storage requirement of 10.5 MG. When considering near term conditions without PVOU project water, there is a storage surplus.

For the near term condition (i.e. the next five years), the water demand for LPVCWD and CIWS will increase by approximately 5% from current demands, as shown in **Table 6** and **Table 7**.

However, to accommodate the additional flow of 1,750 gpm from PVOU, a 1.5MG reservoir would need to be constructed for both alternatives to ensure that an uninterruptible storage is available. The total required storage is 13.8 MG to supply emergency and operational storage for the PVOU project in the near term condition. This results in a 1.5 MG deficit to the storage capacity of the existing reservoir system.

Table 6 – Current Storage Requirement

LP	GPM	Emergency (Gal)	Operational (Gal)	CIWS	GPM	Emergency (Gal)	Operational (Gal)
MDD	2,373	3,416,813	1,025,043	MDD	2,006	2,888,285	866,485
Fire Flow	4,000	960,000	-	Fire Flow	4,000	960,000	-
PVOU	1,750	2,520,000	756,000	-	-	-	-
						Total	13,392,627

Table 7 – Near Term Storage Requirement

LP	GPM	Emergency (Gal)	Operational (Gal)	CIWS	GPM	Emergency (Gal)	Operational (Gal)
MDD	2,494	3,591,104	1,077,331	MDD	2,108	3,035,617	910,685
Fire Flow	4,000	960,000	-	Fire Flow	4,000	960,000	-
PVOU	1,750	2,520,000	756,000	-	-	-	-
						Total	13,810,737

When considering the nature of delivery of PVOU project water through the respective systems, the provision for providing uninterruptible supply to RWD may not be necessary. Provided that project stakeholders are agreeable to interruptible storage and supply when PVOU project water is unavailable or if there were an event in either the LPVCWD or CIWS systems that depleted storage, the requirement of providing one day of emergency storage of PVOU project water may be eliminated. In light of this, the total storage requirement when considering only operational storage of 30% PVOU water is 11.3 MG. As a result, there is adequate storage capacity in both LPVCWD and CIWS systems to support the PVOU operation and additional reservoir capacity is not needed. Further cost analysis assumes that this is the case.

Chloramination Facility Analysis

For Alternative A and B, a new chloramination facility must be constructed. The new chloramination facility will consist of the following:

- A 1,000-gallon sodium hypochlorite (12.5%) storage vessel
- A 300-gallon aqueous ammonia (19%) storage vessel
- A 150-gallon scrubber tank
- One flow control valve
- Four chemical metering pumps (2 for sodium hypochlorite and 2 for aqueous ammonia)
- One static mixer
- Two chlorine residual analyzers (1 for influent water and 1 for effluent water)
- One Ammonia analyzer, SCADA system, Chemical Storage Shelter

In Alternative A, the chloramination facility would be constructed within the existing CIWS Industry Hills Pump Station No. 3 site which is located approximately 30’ north of the Industry Hills Parkway and is accessible by the use of a driveway shared with the Pacific Palms Golf Resort. This location may pose difficulty in receiving regular deliveries of sodium hypochlorite and aqueous ammonia.

In Alternative B, the chloramination facility will be located on LPVCWD property with proper access to Main Street, which should not pose any significant issue with regular chemical deliveries.

Cost Analysis

For the purpose of delivering the water (1,750 gpm) from PVOU to RWD, there are several facility improvements needed to be performed such as interconnections, pumps, a chloramination facility and pipeline installations.

Alternative A

For Alternative A, the cost estimate includes costs associated with the interconnections that will be either constructed or upgraded, the installation of two new vertical turbine pumps and associated electrical equipment, the new configuration of distribution piping, and the construction of the new chloramination facility. The Construction and O&M cost for Alternative A are shown in **Table 8** and **Table 9**.

Table 8 – Construction Cost of Alternative A

Item#	Description	Quantity	Unit	Unit Cost	Total Cost
1	Mobilization, Demobilization and Bonding	1	LS	$17,070	$17,070
2	Provide excavation safety measures	1	LS	$3,500	$3,500
3	Construct 12" Interconnection (Interconnection 1)	1	LS	$50,000	$50,000
4	Construct 16" Interconnection (Interconnection 2)	1	LS	$50,000	$50,000
5	Upgrade Interconnection between LPW 16" and RWD 8" water line (Interconnection 3)	1	LS	$75,000	$75,000
6	Construct Pressure Sustaining Valve to LPW Zone 2	1	LS	$100,000	$100,000
7	Furnish and Install Pump equipment at IHPS #1 and #2 including Motor, electrical, discharge head and fittings, gaskets, etc.	150	HP	$1,500	$225,000
8	New Chloramination Facility	1	LS	$350,000	$350,000
9	Pressure Test and Disinfect	1	LS	$10,000	$10,000
Sub Total					**$880,570**
15% Construction Contingency					**$132,086**
20% Engineering/Admin/Planning					**$176,114**
Grand Total					**$1,188,770**

Table 9 – Annual Operation and Maintenance Cost of Alternative A

Item#	Description	Quantity	Unit	Unit Cost	Total Cost/Year
1	Booster station replacement	1.5%	%Capital Cost/Annum		$3,375
2	Booster Production Energy	1467300	Kwh/Annum	$0.11	$161,403
3	Pipeline Replacement Cost	0.15%	%Capital Cost/Annum		$413
4	Chloramination Replacement Cost	2.5%	%Capital Cost/Annum		$8,750
5	Chemical Cost	19308	Gallons/Annum	$1.33	$25,679
6	System O&M	3.5	Man Days/Month	$7,200.00	$25,200
Total Annual Cost					**$224,820**

Alternative B

For Alternative B, the cost estimate includes costs associated with the interconnections that will be either constructed or upgraded, the construction of the new pump station that includes the two pumps, and the construction of a chloramination facility at the Main Street Reservoir Site. About 7,000 linear feet of pipeline will also be required from new pump station to the RWD connection. Construction and O&M cost for Alternative B are shown in **Table 10** and **Table 11**.

Table 10 – Construction Cost of Alternative B

Item#	Description	Quantity	Unit	Unit Cost	Total Cost
1	Mobilization, Demobilization and Bonding	1	LS	$43,270	$43,270
2	Provide excavation safety measures	1	LS	$3,500	$3,500
3	Construct 12" Interconnection (Interconnection 1)	1	LS	$50,000	$50,000
4	Upgrade Interconnection between LPW 16" and RWD 8" water line (Interconnection 3)	1	LS	$75,000	$75,000
6	Construct 12" pipeline after new pump station to RWD interconnect	7000	LF	$175	$1,225,000
7	Construct Pump Station including Motor, electrical, discharge head and fittings, gaskets, etc.	150	HP	$3,000	$450,000
11	New Chloramination Facility	1	LS	$350,000	$350,000
12	Pressure Test and Disinfect	1	LS	$10,000	$10,000
Sub Total					**$2,206,770**
15% Construction Contingency					**$331,016**
20% Engineering/Admin/Planning					**$441,354**
Grand Total					**$2,979,140**

Table 11 – Annual Operation and Maintenance Cost of Alternative B

Item#	Description	Quantity	Unit	Unit Cost	Total Cost/Year
1	Booster station replacement	1.5%	%Capital Cost/Annum		$6,750
2	Booster Production Energy	1589575	Kwh/Annum	$0.11	$174,853
3	Pipeline Replacement Cost	0.15%	%Capital Cost/Annum		$2,025
4	Chloramination Replacement Cost	2.5%	%Capital Cost/Annum		$8,750
5	Chemical Cost	19308	Gallons/Annum	$1.33	$25,679
6	System O&M	3.5	Man Days/Month	$7,200.00	$25,200
Total Annual Cost					**$243,257**

The total construction cost for Alternative A and Alternative B is $1.2 M and $3.0 M, respectively. The main difference between each total cost is the construction of the new pump station needed for Alternative B.

Conclusion

The purpose of this project was to analyze the storage and pump station capacity for delivering potential maximum water demand to RWD (1,750 gpm) from the PVOU IZ treatment facility.

The current pumps at both water systems are adequate to deliver the MDD and Fire flow for existing condition; however, an additional booster pump needs be constructed to deliver 1,750 gpm to RWD. For Alternative B, a new booster station needs be constructed with two different booster pumps each having 75 hp capacity. For Alternative A, new 75 hp booster pump will be installed at Industry Hills pump station 1 and 2.

The current storage capacity for LPVCWD and CIWS is sufficient to provide operational storage for the PVOU project water.

The cost for two alternatives are as follow:

Alternative	Construction Cost	Annual O&M Cost
A	$1,188,770	$224,820
B	$2,979,140	$243,257

Based on the cost analysis of construction and annual operation and maintenance for both alternatives, Alternative A is a more economical option.

Considering the integrity of the 16” waterline in Alternative A; when subject to higher pressures, it is recommended that pressure testing of this pipeline under pressures comparable to future conditions be performed prior to moving forward with implementation of Alternative A. If testing concludes that the 16” waterline cannot hold water satisfactorily at the higher pressures, the addition of a dedicated parallel pipe from Industry Hills Booster Station No. 3 to the RWD connection would be warranted for full implementation of Alternative A. In this scenario, the cost benefit of Alternative A over B would diminish.

Also chemical addition to chloraminate water compatible with the RWD system adds an additional level of complexity to both Alternative A and B. Alternative A installs the disinfection system at the existing Industry Hills Pump Station No. 3 site. Access to the site is constrained and delivery of chemicals will need to be planned so as to allow for satisfactory operation of chemical delivery equipment and coordination with the Pacific Palms resort. In addition, Alternative A completely changes the current use of the transmission main from Industry Hills Pump Station No. 3 to RWD point of connection. Previously this pipeline provided the capability to deliver chemically compatible water to and from LPVCWD and CIWS. What’s more, in Alternative A solution only chloraminated water can be delivered from CIWS through the transmission main to RWD. Supply of LPVCWD water to CIWS through pumping of the Industry Hills Pump Station No. 3 is abandoned and this emergency supply to CIWS is eliminated. Also this configuration minimizes the use of supply of CIWS water to LPVCWD as water in this pipeline will now be chloraminated and use in the LPVCWD will require additional monitoring and/or the stopping of delivery of chloraminated water to RWD in favor of emergency supply to LPVCWD as a free chlorine system.

In Alternative B, chloramination can be performed without materially impacting the LPVCWD system because the proposed transmission main is completely dedicated to RWD supply. The site also exhibits greater access capabilities for delivery of chemical. When making the ultimate decision for implementation, the foregoing observations should be considered.

If you have any further questions or comments, please feel free to call me at (626) 357-0588 or email me at shawes@civiltec.com.

Very truly yours,
CIVILTEC engineering, inc.

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