



WATER MASTER PLAN

November 2023



City of Monterey Park
320 West Newmark Avenue
Monterey Park, CA 91754



CITY OF MONTEREY PARK

WATER MASTER PLAN



Submitted to:
City of Monterey Park
320 West Newmark Avenue
Monterey Park, California 91754

Submitted by:
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November 2023



Date of Signing: 11/30/23



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TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
ES EXECUTIVE SUMMARY	ES-1
ES-1 General.....	ES-1
ES-2 Water Service Area	ES-1
ES-3 Water Supply.....	ES-1
ES3.1 Groundwater Supply.....	ES-1
ES3.2 Imported Water Supply.....	ES-1
ES-4 Water Use	ES-2
ES4.1 Water Demand Variation	ES-2
ES-5 Existing System.....	ES-3
ES-5.1 Transmission and Distribution System.....	ES-3
ES-5.2 Storage Reservoirs.....	ES-3
ES-5.3 Booster Pump Stations.....	ES-7
ES-5.4 Wells.....	ES-7
ES-5.5 Water Treatment.....	ES-7
ES-5.6 Pressure Regulating Stations	ES-7
ES-5.7 Agency Interconnections	ES-7
ES-6 Hydraulic Model, Calibration, and Analysis	ES-8
ES-7 Pipe Risk Assessment.....	ES-8
ES-7.1 Historical Pipe Break Data.....	ES-8
ES-7.2 Risk Assessment	ES-9
ES-7.3 Risk Analysis Results	ES-9
ES-8 Capital Improvement Program.....	ES-9
1 INTRODUCTION	
1-1 Purpose.....	1-1
1-2 Previous Studies.....	1-1
1-3 Scope of Work.....	1-1
1-4 Organization of Report	1-2
1-5 Acknowledgements	1-2
1-6 Abbreviations.....	1-2
2 WATER SERVICE AREA	
2-1 Location.....	2-1
2-2 Topography and Geology	2-1
2-3 Climate	2-1
2-4 Water Service Area	2-4
2-5 Land Use.....	2-5
2-6 Population	2-8
3 WATER SUPPLY ANALYSIS	
3-1 Water Supply Sources.....	3-1
3-1.1 Groundwater.....	3-1
3-1.2 Emergency Connections.....	3-2
3-1.3 San Gabriel Valley Water Company	3-2

3-1.4	Current City Treatment Plants	3-2
3-2	Existing Groundwater Rights	3-4
3-2.1	Judgements	3-6
3-2.2	Main San Gabriel Basin Watermaster.....	3-6
3-2.3	San Gabriel Basin Water Quality Authority	3-6
3-2.4	Safe Yields and Water Rights.....	3-7
3-2.5	Assessments	3-8
3-3	San Gabriel Basin Hydrogeologic Conditions.....	3-9
3-3.1	Basin Characteristics.....	3-9
3-3.2	Flow Characteristics	3-9
3-3.3	Storage.....	3-10
3-3.4	Main Basin Replenishment.....	3-10
3-3.5	Groundwater Quality.....	3-12
3-4	Potential Local Groundwater Supply Development	3-13
3-4.1	Pure Water Southern California.....	3-13
3-5	Future Groundwater and Imported Water Availability	3-19
3-5.1	Groundwater.....	3-19
3-5.1.1	Main Basin Conditions	3-19
3-5.1.2	Cyclic Storage and Conjunctive Use Agreements	3-20
3-6	Potential for Recharge Using Recycled Water and Stormwater Capture.....	3-21
3-6.1	Recycled Water	3-21
3-6.1.1	Direct Water Recycling	3-21
3-6.1.2	Regional Recycled Water Recharge.....	3-25
3-6.2	Stormwater	3-25
3-7	Water Banking.....	3-28
3-8	Water Conservation and Rationing.....	3-29
3-8.1	Water Conservation.....	3-29
3-8.2	Water Rationing.....	3-31
3-9	Main Basin Water Rights Purchases	3-32
3-10	Recommendations.....	3-33
3-10.1	Support Groundwater Projects that Increase Main Basin Operating Safe Yield	3-33
3-10.2	Investigate Cyclic Storage to Offset Imported Water Costs	3-33
3-10.3	Continue to Implement Water Conservation Measures to Reduce Water Demand ...	3-33
3-10.4	Pursue the Purchase of Additional Main Basin Groundwater Rights	3-33
3-10.5	Actively Participate in Main Basin Water Policy Decisions	3-33
3-10.6	Develop an Indirect Recycled Water Project	3-34
4	WATER USE	
4-1	Historical Annual Water Use.....	4-1
4-2	Non-Revenue Water.....	4-3
4-3	Water Demand Variations	4-3
4-3.1	Monthly Demand Variations.....	4-3
4-3.2	Daily Demand Variations	4-5
4-3.3	Hourly Demand Variations.....	4-6
4-4	Existing System Demands and Peaking Factors	4-6
4-5	Water Unit Demand Factors	4-9
4-6	Future Demands.....	4-10

4-6.1	Future Development Demands	4-10
4-6.2	Reduction in Indoor Water Use.....	4-13
4-6.3	Accessory Dwelling Units	4-13
4-7	Water Conservation.....	4-15
5	EXISTING SYSTEM	
5-1	General	5-1
5-2	Pressure Zones	5-1
5-3	Transmission and Distribution System	5-5
5-4	Storage Reservoirs.....	5-7
5-5	Booster Pump Stations.....	5-7
5-6	Wells	5-7
5-7	Water Treatment.....	5-7
5-8	Pressure Regulating Stations	5-11
5-9	Agency Interconnections	5-12
6	PERFORMANCE EVALUATION CRITERIA	
6-1	General.....	6-1
6-2	Sources of Supply	6-2
6-3	Storage.....	6-2
6-3.1	Operational Storage.....	6-3
6-3.2	Emergency Storage	6-3
6-3.3	Fire Suppression Storage	6-4
6-4	Wells	6-4
6-5	Booster Pump Stations	6-4
6-6	Service Pressures	6-5
6-7	Transmission and Distribution System Pipelines	6-5
6-8	Fire Suppression	6-6
6-9	Service Life of Facilities.....	6-8
6-10	Operational Flexibility	6-9
6-11	Distribution System Maintenance Program	6-9
7	HYDRUALIC MODEL	
7-1	General.....	7-1
7-2	Demand Distribution	7-1
7-2.1	Existing Demands	7-1
7-2.2	Future Demands	7-2
7-3	Diurnal Curves.....	7-2
7-4	Model Scenarios.....	7-2
7-4.1	Model Scenarios and Datasets	7-2
7-4.2	Model Facility Datasets.....	7-4
7-5	Facility Model Characteristics and Control Settings.....	7-5
7-5.1	Storage Reservoirs	7-5
7-5.2	Wells	7-5
7-5.3	Booster Pump Stations	7-5
7-5.4	Imported Water Connections	7-10
7-6	Friction Factors.....	7-10

8	MODEL CALIBRATION	
8-1	General.....	8-1
8-2	Supervisory Control and Data Acquisition (SCADA) Data	8-1
8-3	Field Collected Data	8-1
8-4	Calibration Period.....	8-1
8-5	Demand Allocation	8-3
8-6	Zonal Diurnal Curves.....	8-3
8-8	Imported Water Connections.....	8-3
8-9	Booster Pump Stations.....	8-3
8-10	Reservoirs	8-3
8-11	Zone 2 Inoperable Valve	8-3
8-12	System Pressures	8-4
9	SYSTEM HYDRAULIC ANALYSIS	
9-1	General	9-1
9-2	Source of Supply	9-1
9-3	Storage.....	9-2
	9-3.1 Operational Storage.....	9-2
	9-3.2 Emergency Storage.....	9-2
	9-3.3 Fire Suppression Storage	9-2
	9-3.4 Storage Analysis by Zone	9-3
9-4	Booster Pump Stations.....	9-3
	9-4.1 Open Zones.....	9-3
	9-4.2 Closed Zones.....	9-5
9-5	System Pressures and Velocities	9-6
	9-5.1 System Pressures.....	9-7
	9-5.2 Pipe Velocities	9-9
9-6	Fire Flow Analysis	9-9
9-7	Reliability and Redundancy Recommendations	9-13
	9-7.1 Imported Water Scenario.....	9-13
	9-7.2 Redundancy Projects.....	9-13
	9-7.3 Pressure Regulating Stations	9-14
10	PIPELINE RISK ASSESSMENT	
10-1	Introduction	10-1
10-2	Historical Pipe Break Data.....	10-1
10-3	Risk Assessment	10-3
10-4	Risk Analysis Results	10-4
11	CAPITAL IMPROVEMENT PROGRAM	
11-1	General	11-1
11-2	Project Cost Estimates	11-1
	11-2.1 Pipeline Construction Cost Estimates.....	11-1
	11-2.2 Total Project Cost Estimates	11-1
11-3	Project Priorities	11-2
	11-3.1 Fire Flow Pipe Replacement Priorities.....	11-2
11-4	Improvement Projects.....	11-2
11-5	Capital Improvement Program Summary	11-4

APPENDICES

- References
- 8.1 Booster Pump Flows during Calibration Period
- 8.2 Reservoir Levels during Calibration Period
- 8.3 Pressure Data During Calibration Period

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1-1	Abbreviations	1-3
2-1	Water Service Area Land Uses.....	2-5
2-2	Land Use Designations and Uses.....	2-7
2-3	Estimated Service Area Population	2-8
3-1	Historical City Basin Entitlements	3-8
3-2	Main Basin Assessments.....	3-9
3-3	City of Monterey Park 2022 Water Quality.....	3-17
3-4	SBX7-7 Target and Performance.....	3-30
3-5	Largest Main Basin Groundwater Rights Users	3-32
4-1	Historic Annual Water Production and Purchase	4-2
4-2	Non-Revenue Water	4-3
4-3	Monthly Water Production and Demand Factors	4-4
4-4	Water Consumption versus Water Production and Purchase	4-5
4-5	Water System Demands and Peaking Factors	4-8
4-6	Water System Demands by Zone	4-9
4-7	Water Unit Demand Factors	4-10
4-8	Future Development Demands	4-11
4-9	Future Water Demands by Zone.....	4-13
5-1	Water Meter Type	5-1
5-2	City of Monterey Park Pressure Zones	5-2
5-3	Existing Reservoir Data	5-8
5-4	Existing Booster Pump Station Data.....	5-9
5-5	Existing Well Data.....	5-10
5-6	Pressure Regulating Stations	5-11
5-7	Agency Interconnections	5-13
6-1	Performance Evaluation Criteria	6-1
6-2	Required Fire Flow for One and Two Family Dwellings, Group R-3 and R-4 Buildings and Townhouses	6-6
6-3	Required Fire Flow for Buildings Other than One and Two Family Dwellings, Group R-3 and R-4 Buildings and Townhouses	6-6
6-4	Reference Table for Table 6-2 and 6-3.....	6-7
6-5	Fire Flow and Fire Hydrant Location Criteria	6-8
6-6	Planning Criteria for Facility Useful Life	6-9
7-1	Existing Model Scenarios and Data Sets.....	7-3
7-2	Model Facility Sets.....	7-4
7-3	Storage Reservoir Characteristics	7-6

7-4	Well Pump Control Settings.....	7-7
7-5	Booster Pump Station Sequencing Controls.....	7-8
7-6	Imported Water Connection Controls.....	7-10
7-7	Pipe Roughness Coefficients.....	7-10
8-1	Pressure Data Comparisons.....	8-5
9-1	Groundwater Supply.....	9-1
9-2	Imported Water Connection Capacities.....	9-2
9-3	Storage Analysis by Zone.....	9-3
9-4	Booster Pump Station Analysis for Open Zones.....	9-4
9-5	Booster Pump Station Analysis for Closed Zones.....	9-5
9-6	System Pressures.....	9-7
10-1	Breaks by Pipe Material.....	10-2
10-2	Breaks by Pipe Year of Construction.....	10-2
10-3	Breaks by Pipe Diameter.....	10-2
10-4	Weighting Factors and Risk Scores.....	10-4
11-1	Capital Improvement Program.....	11-5

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
ES-1	Annual Water Production and Purchase.....	ES-2
ES-2	Diurnal Curves.....	ES-4
ES-3	Existing System.....	ES-5
ES-4	Hydraulic Schematic.....	ES-6
2-1	Regional Location Map.....	2-2
2-2	Soils Map.....	2-3
2-3	Rainfall 2008-2023.....	2-4
2-4	Land Use Map.....	2-6
2-5	City Population History.....	2-8
3-1	Main San Gabriel Basin.....	3-5
3-2	Main Basin Groundwater Flow.....	3-11
3-3	Baldwin Park Key Well Elevations.....	3-12
3-4	VOC Containment in Intermediate Areas.....	3-14
3-5	Delta Plant and Vicinity.....	3-15
3-6	Capture Zones.....	3-16
3-7	MWD Pure Water Program.....	3-18
3-8	Main Basin Historical Runoff.....	3-19
3-9	Historical Water Demand Trends.....	3-20
3-10	Phase 1 Proposed Recycled Water System Alignment and Pipeline Sizes.....	3-21
3-11	Phase 2 Proposed Recycled Water System Alignment and Pipeline Sizes.....	3-22
3-12	Phase 3 Proposed Recycled Water System Alignment and Pipeline Size Looped System.....	3-23
3-13	Phase 3 Proposed Recycled Water System Alignment and Pipeline Sizes Non-Looped System.....	3-24
3-14	Proposed MWD Pure Water Southern California Project Facilities.....	3-26

3-15 SCWP Unit Cost by Amount of Stormwater Captured 3-27
4-1 Historic Annual Water Production and Purchase 4-1
4-2 Monthly Demand Factors..... 4-5
4-3 Diurnal Curves..... 4-7
4-4 Future Development Locations 4-12
5-1 Existing System 5-3
5-2 Existing Hydraulic Schematic 5-4
5-3 Pipe Length by Size..... 5-5
5-4 Pipe Length by Construction Date 5-6
5-5 Pipe Length by Material 5-6
8-1 Pressure Data Logger Location 8-2
9-1 Existing Maximum Day Demand Minimum Pressures 9-8
9-2 Initial Fire Flow Analysis Residual Pressures 9-10
10-1 Normalized Number of Breaks by Pipe Material 10-2
10-2 Normalized Number of Breaks by Year of Construction 10-3
10-3 Normalized Number of Breaks by Pipe Diameter 10-3
10-4 Risk Assessment Map 10-5

LIST OF PLATES

Plate

A Recommended Project Locations

LIST OF PHOTOGRAPHS

Photograph No.

Page

5-1 Well 1, 3, 10 and Fern Treatment Facility 5-7

SECTION ES

EXECUTIVE SUMMARY

ES-1 General

The City of Monterey Park (City) provides potable water service to residential, commercial, industrial, public parks and schools. The City recognizes its responsibility to efficiently meet the customers' needs with long range planning efforts. By reviewing its existing water system and future needs, the City can continue to maintain a high service level and reliability in its water system in a cost effective and fiscally responsible manner. This report is intended to update the domestic water analysis and to provide a comprehensive planning guide for improving and upgrading the City's domestic water system.

ES-2 Water Service Area

The City of Monterey Park is located in the San Gabriel Valley, just east of Los Angeles. The City corporate boundary is approximately 5,035 acres, with a water service area that is approximately 4,200 acres. The service area is comprised of residential, commercial, employment, and mixed uses.

Per the City's 2020 Urban Water Management Plan (UWMP, 2020), the water service area population was 59,473 in 2020 and is projected to have a minimal growth of 5.7% from 2020 to 2045. The 2045 service area population is expected to be about 62,876.

ES-3 Water Supply

The City's existing potable water supply consists almost entirely of groundwater from the City's eight active wells.

From 2012 through 2022, the City pumped an average of 7,765 AFY from the groundwater basin and imported 96 AFY from San Gabriel Valley Municipal Water District (SCVMWD). On average, 99 percent of the supply is water pumped from the groundwater basin and 1 percent of the supply was purchased imported water.

ES-3.1 Groundwater Supply

Groundwater is pumped from the Main San Gabriel Basin (Main Basin), which is a subbasin of the San Gabriel Valley Basin. Main Basin is adjudicated, and is managed by the Main Basin Watermaster (Watermaster). Each year the Watermaster reviews water supply conditions including local rainfall, groundwater levels, local stormwater runoff available for replenishment, imported water availability and the amount of imported water stored in the groundwater basin for future demands. The Watermaster identifies the annual amount of groundwater which may be pumped (Operating Safe Yield) before the City would need to purchase more expensive imported water from San Gabriel Valley Municipal Water District (SGVMWD) or from Main Basin Replacement Water Assessment program. The City's OSY is 3.392% or 5,088 acre-feet per year through 2027.

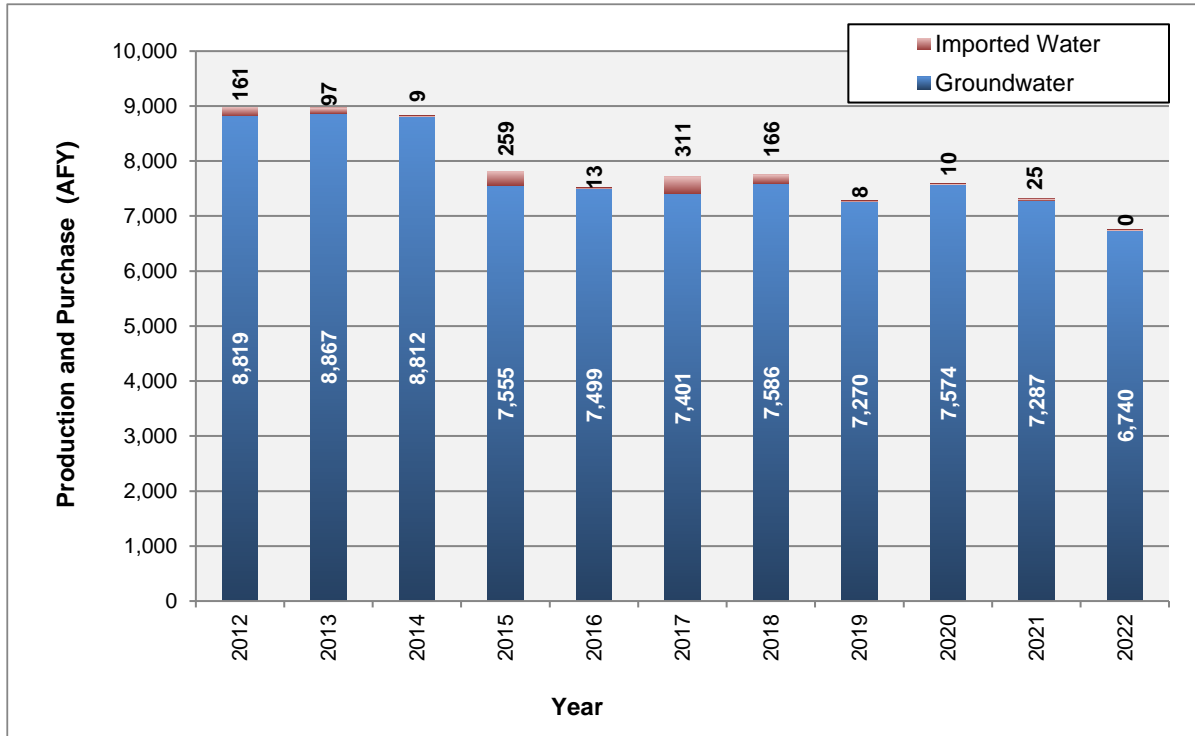
ES-3.2 Imported Water Supply

The City can purchase local groundwater from San Gabriel Valley Water Company (SGVWC) by utilizing the one (1) active interconnection located at the Well 7 site. The SGVWC interconnection is 10-inch, with a maximum capacity of 4,000 gallons per minute (gpm) or 9.0 cubic feet per second (cfs). The City purchases local groundwater from SGVWC as a supplemental water supply source during periods when the City's own water system is down due to maintenance or emergency repair.

ES-4 Water Use

The total annual water production and purchase from 2012 to 2022, shown in Figure ES-1, ranged from 6,740 AFY to 8,980 AFY. Since 2014, when the drought was declared in California, the total water production/purchase has decreased about 24 percent from about 8,821 AFY to 6,740 AFY. This may be due in part to the economic climate and a very conscientious water conservation effort by the City and the public. The City’s annual non-revenue water averages 8.1 percent, which is within the industry standard (10 percent or less).

**Figure ES-1
Annual Water Production and Purchase**



ES-4.1 Water Demand Variation

The average day demand is based on the City of Monterey Park’s production and purchase records for the past five years (2018-2022). The average day demand is approximately 4,547 gpm (6.55 mgd; 7,333 AFY).

Demand variations through a year are influenced by seasonal effects such as temperature, humidity, and precipitation. System demand variations throughout the day are influenced by the customer base and the daily lifestyles of the customers.

Typical of most Southern California communities, the City’s water consumption exhibits a distinct seasonal pattern. Peak and low monthly consumption occur during the dry summer months and wet winter months, respectively. The highest and lowest monthly demand factors between 2018 and 2022 are 1.19 and 0.75, respectively.

Within any given month, demand can vary based on usage patterns (i.e., weekend usage is typically different than weekdays) and other factors such as irrigation schedules. The maximum demand day occurring over the course of the year is an important parameter for planning purposes as the required

source of supply is based on this demand. The maximum day demand factor is estimated to be 1.45 times the average day demand. The maximum day demand is therefore estimated to be about 6,593 gpm (9.49 mgd; or 10,633 AFY).

Knowledge of accurate demand variations over a 24-hour period is essential for proper analysis of water systems. For this study, hourly demand variations were represented by the development of diurnal demand curves for each hydraulic zone. The diurnal demand curves were employed in determining the adequacy of the sources of supply, pumping facilities, reservoirs, and the transmission/distribution facilities. The average weekday diurnal curves developed for this study are shown in Figure ES-2.

ES-5 Existing System

The City's existing water system is shown on Figure ES-3. The hydraulic schematic of the existing system is shown on Figure ES-4. The City operates and maintains the following facilities:

- 5 primary pressure zones
- 8 closed sub-zones
- 134.7 miles of transmission and distribution system pipe ranging in size from 2-inch to 24-inches in diameter
- 8 active wells, 4 inactive wells
- 11 service zone storage reservoirs
- 2 settling tanks
- 11 booster pump stations (3 hydropneumatic)
- 19 pressure reducing stations
- 1 imported water supply connection
- 4 emergency interconnections
- 14,018 water meter connections

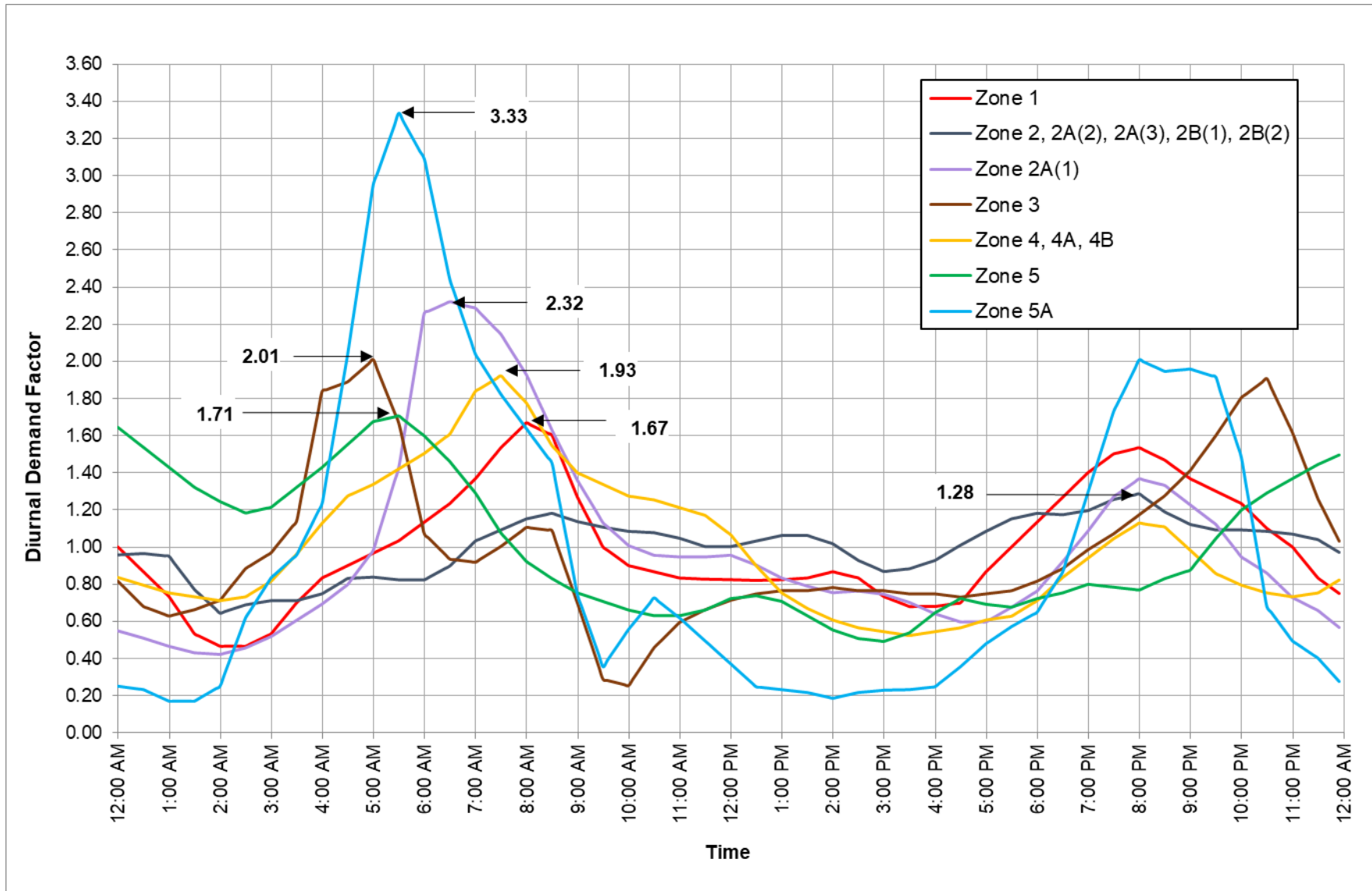
ES-5.1 Transmission and Distribution System

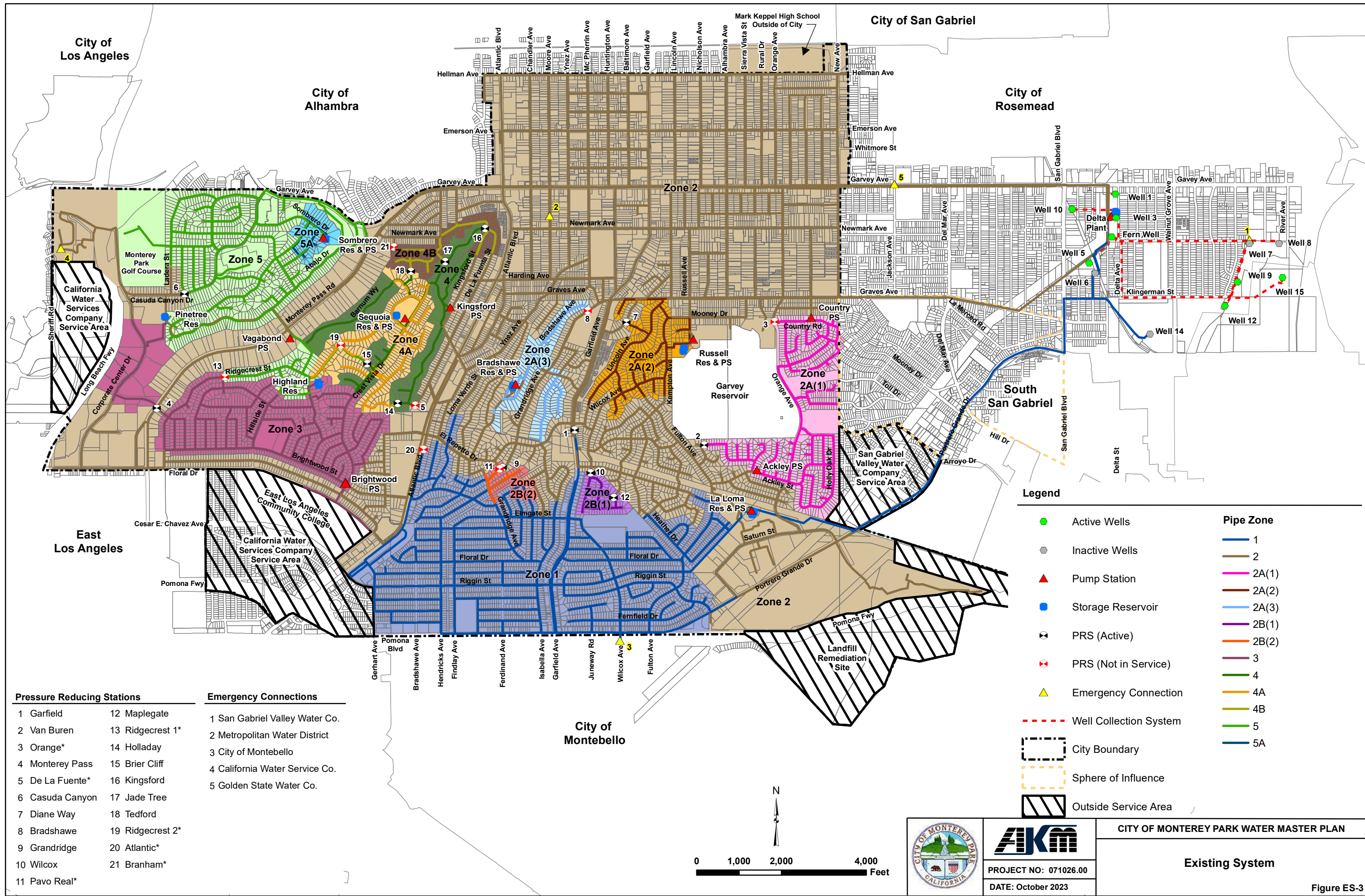
The existing water system includes approximately 135 miles of transmission and distribution pipe that ranges in size from 2-inch through 24-inches. The majority of the pipe is 8-inches (29.4%) or 6-inches (29.2%) in diameter. Most of the pipes are made of cast iron (38.7%) or asbestos cement (31.0%). Most of the pipes were constructed in the 1950's (30.8%).

ES-5.2 Storage Reservoirs

The water system consists of thirteen (13) reservoirs, including the two settling tanks located at the Delta Plant. The City's total reservoir capacity is 19.66 MG, with over half of the storage located within Zone 2, which is the largest service zone. The hydraulic gradient in each of the five primary zones is controlled by the high water elevation of the reservoirs that feed the zones by gravity. Existing reservoir data is shown in Table 5-3.

Figure ES-2
Diurnal Curves





Pressure Reducing Stations

1 Garfield	12 Maplegate
2 Van Buren	13 Ridgcrest 1*
3 Orange*	14 Holladay
4 Monterey Pass	15 Brier Cliff
5 De La Fuente*	16 Kingsford
6 Casuda Canyon	17 Jade Tree
7 Diane Way	18 Tedford
8 Bradshawe	19 Ridgcrest 2*
9 Grandridge	20 Atlantic*
10 Wilcox	21 Branham*
11 Pavo Real*	

Emergency Connections

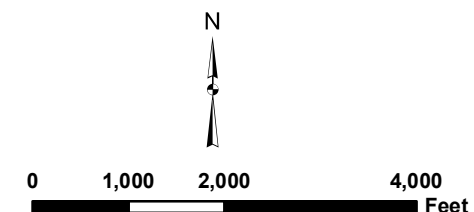
1 San Gabriel Valley Water Co.
2 Metropolitan Water District
3 City of Montebello
4 California Water Service Co.
5 Golden State Water Co.

Legend

- Active Wells
- Inactive Wells
- ▲ Pump Station
- Storage Reservoir
- PRS (Active)
- PRS (Not in Service)
- ▲ Emergency Connection
- Well Collection System
- City Boundary
- Sphere of Influence
- Outside Service Area

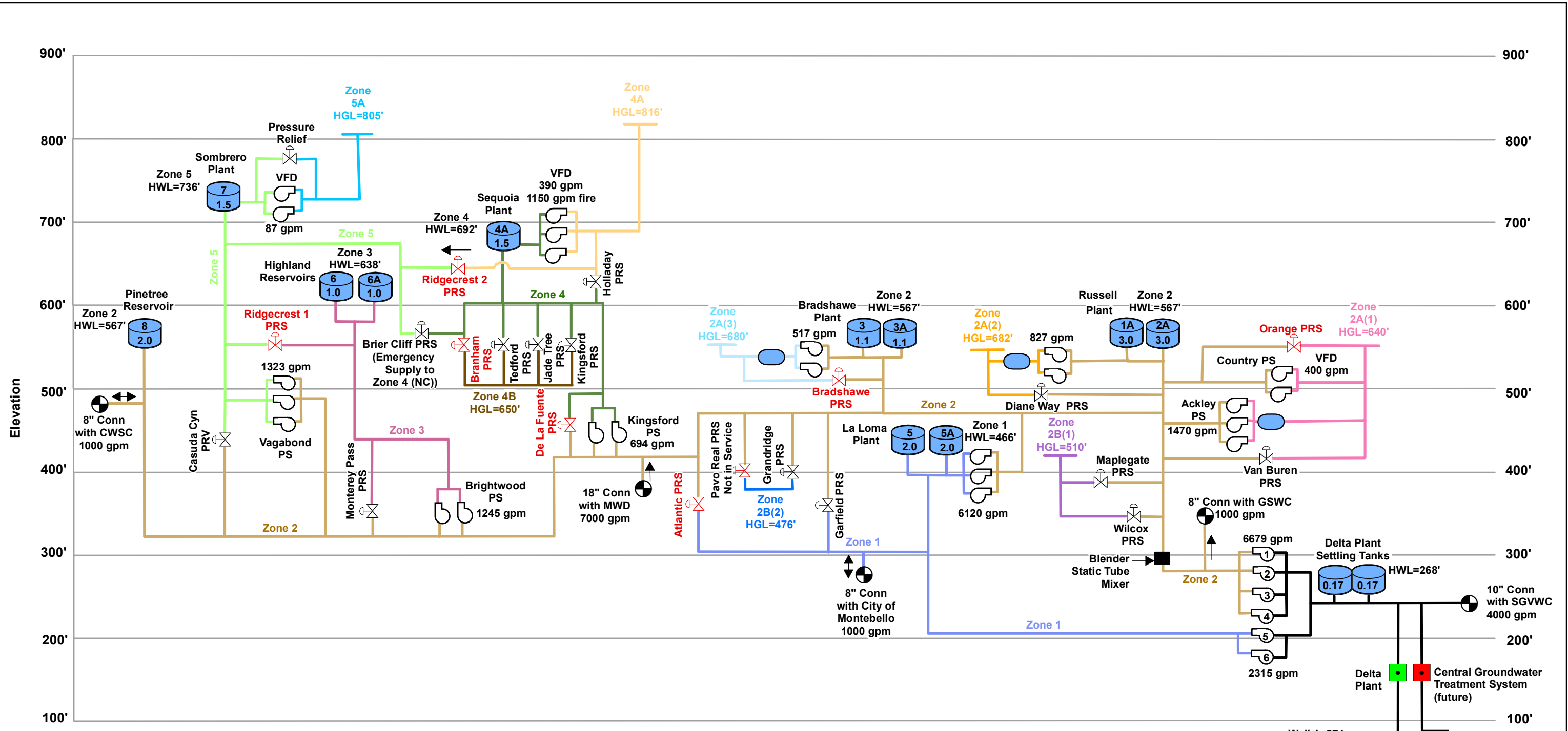
Pipe Zone

- 1
- 2
- 2A(1)
- 2A(2)
- 2A(3)
- 2B(1)
- 2B(2)
- 3
- 4
- 4A
- 4B
- 5
- 5A



AKM
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CITY OF MONTEREY PARK WATER MASTER PLAN
Existing System
Figure ES-3



Legend

- Reservoir Designation
- Reservoir Volume in mgd
- Hydropneumatic Tank
- Booster Pump with PS Firm Capacity (Available Pump Efficiency Test)
- PRS (Active)
- PRS (Not in Service)
- Well with Design Capacity in gpm
- Emergency Connection with Estimated Capacity in gpm

- Delta Plant
- Central Groundwater Treatment System (Future)
- CWSC** California Water Services Company
- GSWC** Golden State Water Company
- HWL** High Water Level
- MWD** Metropolitan Water District
- NC** Normally Closed
- PS** Pump Station

- Zone 1
- Zone 2
- Zone 2A(1)
- Zone 2A(2)
- Zone 2A(3)
- Zone 2B(1)
- Zone 2B(2)
- Zone 3
- Zone 4
- Zone 4A
- Zone 4B
- Zone 5
- Zone 5A

- Well 1: 574 gpm
- Well 3: 745 gpm
- Well 10: 1332 gpm
- Fern: 965 gpm
- Well 5: 775 gpm
- Well 9: 1758 gpm
- Well 12: 2050 gpm
- Well 15: 2435 gpm

Notes: Wells 6, 7, 8, and 14 are inactive

		CITY OF MONTEREY PARK WATER MASTER PLAN
	PROJECT NO: 071026.00 DATE: October 2023	Hydraulic Schematic

Figure ES-4

ES-5.3 Booster Pump Stations

The water system includes eleven (11) booster pump stations. The primary pump station that feeds the well water to the system is located at the Delta Plant. It has six large pumps that pump into Zone 1 and Zone 2 directly. The other ten pump stations convey water up to higher service zones. There are three hydropneumatic pump stations serving Zone 2A(1), 2A(2), and 2A(3). Existing booster pump station data is shown in Table 5-4.

ES-5.4 Wells

The total active well capacity is currently about 13,100 gpm (based on efficiency test data provided by the City). Well information and characteristics are provided in Table 5-5.

ES-5.5 Water Treatment

Historically, the City operated three water treatment facilities for VOCs and/or perchlorate. The three treatment facilities were as follows:

1. Wells 1, 3, 10, and Fern Treatment Facility at the Delta Plant
2. Well 5 Treatment Facility at the Well 5 Site
3. Wells 9, 12, and 15 Treatment Facility at the Well 12 Site and the Delta Plant

The treatment of water will change once the Central Groundwater Treatment System (CTGS) is completed. Water from Well 5, 9, 12, and 15 will be treated at the CGTS. See Section 3-1.4 for a detailed description of the City's plans for future water treatment prior to distribution.

ES-5.6 Pressure Regulating Stations

The City's system includes twenty-one (21) pressure regulating stations (PRS). There are three sub-zones (Zone 2B(1), 2B(2) and 4B) that are fed water entirely through pressure regulating stations. Besides the valves at these PRS, the remaining pressure reducing valves (PRVs) are normally closed and operate under emergency conditions.

The De La Fuente, Bradshawe, Ridgecrest 1, and Ridgecrest 2 PRSs are currently not utilizing the valve pressure regulating capabilities and are manually set to the closed position. It is understood that the Orange, Pavo Real, Atlantic and Branham PRSs were physically constructed, but never piloted to operate in the field. It is recommended that a study be conducted for these eight (8) PRSs to identify the work necessary to place these facilities into service.

The details of each PRS are shown in Table 5-6.

ES-5.7 Agency Interconnections

The City has one active and four emergency interconnections with other water agencies. The active interconnection is a one-way interconnection from San Gabriel Valley Water Company (SGVWC) to the City with a maximum capacity of 4,000 gpm.

The four other interconnections are in place for emergency purposes only. These interconnections are between the City and Golden State Water Company (GSWC), Metropolitan Water District of Southern California (MWD), California Water Service Company (CWSC), and the City of Montebello. These interconnections are not used on a regular basis due to the fact that the City's system utilizes free chlorine and the other systems utilize total chlorine.

The agency interconnections with the location, size and capacity are listed in Table 5-7.

ES-6 Hydraulic Model, Calibration, and Analysis

A computer model of the City's water system was developed in the Innovyze InfowaterPro software platform. It was utilized to aid in the evaluation of the adequacy of the existing facilities under the current and future demand conditions. Details regarding the model development are included in Section 7.

The existing water system model was calibrated to verify the accuracy of the model, system configuration, and the hydraulic parameters utilized. All of the typical indicators of an accurate model were met after performing the calibration of the City's existing water system model. Details regarding the model calibration are included in Section 8.

The established performance evaluation criteria and the calibrated hydraulic model were utilized in analyzing the system and evaluating its adequacy under average day, maximum day, peak hour, and maximum day plus fire flow conditions. Analysis of the City's source of supply, storage, and pumping facilities were also conducted. Existing and future deficiencies were identified, and mitigation projects were formulated based upon the results of the model runs, , and input from City staff. Proposed projects were added in the hydraulic model to test the operation of the system after implementation. The results of the analyses are discussed further in Section 9 and were used in formulating the capital improvement program.

ES-7 Pipe Risk Assessment

Risk relates to the probability of something bad happening, or the likelihood of a negative impact occurring, and over time, a water distribution system will experience water breaks or leaks. These failures in a water system can be caused by multiple factors such as pipe age, pipe material, pipe bedding, internal pressures, water characteristics, external loads (from traffic or soils), soil characteristics, and/or weather. Some of the primary goals of a water utility is to prevent catastrophic failures from occurring, address breaks and leaks as quickly as possible, and continue to provide reliable and safe water to its customers while minimizing disruptions to service.

Risk is the combination of both Likelihood of Failure (LoF) and Consequence of Failure (CoF). It takes into account the asset's physical condition, as well as the impact that its failure would have on system performance. LoF refers to a calculated numerical representation that denotes the probability of failure based on an asset's physical and hydraulic condition. CoF is the combination of direct and indirect impacts on the vicinity and community due to a potential asset failure. Risk is calculated as the product of the LoF and CoF.

AquaTwin Asset, an ArcGIS Pro based software, was utilized to conduct the risk analysis for the City's system. The risk assessment enables the City to take multiple factors into consideration to predict locations of future failures and enable the City to develop a proactive rehabilitation and pipe replacement program.

ES-7.1 Historical Pipe Break Data

The historical pipe break data was plotted on the water system map. Each break was assigned to the nearby pipe by location. In order to evaluate the true causes of the historical breaks, the data was normalized by material, year of construction, and diameter. The following conclusions can be made by reviewing the normalized pipe break data:

1. Steel pipe is very problematic in relation to other pipe materials.
2. Pipes constructed between 1920-1929 are more likely to break than pipes constructed in later

years.

3. Pipes 6-inch and smaller break more frequently than larger pipes

ES-7.2 Risk Assessment

The pipe risk assessment includes an evaluation of the following likelihood of failure (LoF) and consequence of failure (CoF) elements:

- Number of Breaks (LoF)
- Material (LoF)
- Year of Construction (LoF)
- Diameter (LoF)
- Maximum Velocity (LoF)
- Maximum Flow (CoF)

The trends in the break data guided the development of the likelihood of failure (LoF) weightings factors and risk scores. The consequence of failure (CoF) incorporated the overall maximum flow through each pipeline. The pipes that convey more water through the system are prioritized higher because more water in a pipe is an indication that a break could affect more customers, more water could potentially be lost, and the cost to repair the pipe could be higher.

ES-7.3 Risk Analysis Results

The risk values were grouped into Extreme Risk, High Risk, Medium Risk, and Low Risk categories. The top 2% of pipelines with the highest risk value were categorized as pipes with Extreme Risk. This accounts for about 31,700 feet of pipeline. The next 3% of pipelines were categorized as High Risk. This accounts for about 30,500 feet of pipe. The risk analysis results are shown on Figure 10-4.

ES-8 Capital Improvement Program

The Capital Improvement Program (CIP) consists of projects that will enhance the distribution system to meet the established criteria, properly maintain the system's assets, and replace the facilities that have reached the end of their useful lives. The goal of the CIP is to provide the City of Monterey Park with a long-range planning tool for implementing its water system improvements in an orderly manner and a basis for financing of these improvements. In order to accomplish this goal, it is necessary to estimate project costs of the recommended system improvements, establish a basis, and prioritize the projects.

It should be noted that some of the improvements recommended herein are conceptual in nature based on existing available information. Therefore, they should not be considered as absolute for final design. Further analysis and refinement will be necessary prior to commencing work on the final plans, specifications and estimates package for each project. Detailed preliminary design studies should be prepared to select the final design projects.

The recommended project locations are detailed on Plate 11-1, and the detailed project costs are included in Table 11-1. The total Capital Improvement Program costs are summarized, as follows:

High Priority Improvement Projects	\$ 39.4M
Medium Priority Improvement Projects	\$ 92.1M
High Priority Improvement Projects	\$ 9.7M
Priority 1: Fire Flow Improvement Projects	\$ 4.6M
Priority 2: Fire Flow Improvement Projects	\$ 69.7M
Additional Hydrants: Fire Flow Improvement Projects	\$ 0.9M
<u>Extreme Risk Improvement Projects</u>	<u>\$ 34.6M</u>
Total	\$251.0M

SECTION 1 INTRODUCTION

1-1 Purpose

The City of Monterey Park provides domestic water service to a population of approximately 59,473 residents, as well as commercial, industrial, and public facilities. The City recognizes its responsibility to efficiently meet the customers' needs with long range planning efforts. By reviewing its existing water system and future needs, the City can continue to maintain a high service level and reliability in its water system in a cost effective and fiscally responsible manner. This section provides an overview and outline for the City of Monterey Park's Water Master Plan.

1-2 Previous Studies

Previous studies completed and utilized in the development of this Water Master Plan include the following:

- *City of Monterey Park Water System Master Plan
April 2012 by AKM Consulting Engineers*
- *City of Monterey Park, 2014-2021 Housing Element
August 2013 by City of Monterey Park Development Services Department*
- *Monterey Park Land Use and Urban Design Element
June 2020 by City of Monterey Park*
- *System Number 1910092, City of Monterey Park - LWS 2019 Sanitary Survey
April 2021 by State Water Resources Control Board*
- *City of Monterey Park 2020 Urban Water Management Plan
July 2021 by Stetson Engineers*

1-3 Scope of Work

The scope of work for this study consists of the following:

Task 1 – Project Management, Communication, and Meetings

Task 2 – Data Collection and Review

Task 3 – Water Demand Projections

Task 4 – Evaluate Water Source and Treatment Needs

Task 5 – Update Computer Model

Task 6 – Storage Analysis

Task 7 – Criteria and Hydraulic Analysis

Task 8 – Analyze Regulatory Requirements

Task 9 – Capital Improvement Program

Task 10 – Prepare Water Master Plan Update Documents

1-4 Organization of Report

The Monterey Park Water Master Plan describes and documents the totality of the project effort, including the methodology for developing the hydraulic model and system analysis and recommendations for system improvements. A brief outline of the report is as follows:

- Section ES: Executive Summary
- Section 1: Introduction
- Section 2: Water Service Area
- Section 3: Water Supply Analysis
- Section 4: Water Use
- Section 5: Existing System
- Section 6: Performance Evaluation Criteria
- Section 7: Hydraulic Model
- Section 8: Model Calibration
- Section 9: System Hydraulic Analysis
- Section 10: Pipeline Risk Assessment
- Section 11: Capital Improvement Program

1-5 Acknowledgements

AKM Consulting Engineers would like to express their sincere appreciation to the following individuals for their valuable assistance and support throughout the preparation of this study:

- Shawn Igoe, Public Works Director
- Ziad Mazboudi, Interim City Engineer
- George Noriega, Water Distribution Supervisor
- Jaime Green, Water Production System Operator
- Jorge Medina, Water Distribution Crew Supervisor
- Amy Ho, Principal Management Analyst

1-6 Abbreviations

To conserve space and improve readability, abbreviations have been used in this report. Each term abbreviated has been spelled out in the text the first time it is used. Subsequent usage of the term is usually by its abbreviation. The abbreviations utilized in this report are contained in Table 1-1.

**Table 1-1
Abbreviations**

Abbreviation	Explanation
Ac, ac	Acre
AC, ACP	Asbestos Cement Pipe
ADD	Average Day Demand
ADU	Accessory Dwelling Unit
AF	Acre-Foot or Acre Feet
AFY	Acre Feet per Year
AL	Action Level
AO	Advanced Oxidation
AWWA	American Water Works Association
BPOU	Baldwin Park Operable Unit
BPS	Booster Pump Station
CBMWD	Central Basin Municipal Water District
ccf	Hundred Cubic Feet
CC&R	Covenants, Conditions, and Restrictions
cfs	Cubic Feet per Second
CGAC	Catalytic Granular Activated Carbon
CGTS	Central Groundwater Treatment System
CI	Cast Iron
CIP	Capital Improvement Program
City	City of Monterey Park
CoF	Consequence of Failure
Conc	Concrete
CP	Cathodic Protection
CU	Copper
CVP	Central Valley Project
CWSC	California Water Services Company
D/DBPR	Disinfectants/Disinfection By-Products Rule
DDW	Division of Drinking Water
Dia	Diameter
DIP	Ductile Iron Pipe
DTSC	Department of Toxic Substances
DU, du	Dwelling Unit
DWR	State of California, Department of Water Resources
ELAC	East Los Angeles Community College
EL, el	Elevation
EMOU	EI Monte Operable Unit
ENR	Engineering News Record
EPA or USEPA	United States Environmental Protection Agency
F	Fahrenheit

**Table 1-1 (continued)
Abbreviations**

Abbreviation	Explanation
FCV	Flow Control Valve
fps	Feet per Second
ft	Feet
FY	Fiscal Year
GIS	Geographic Information System
gpcd	Gallons per Capita per Day
gpd	Gallons per Day
gpm	Gallons per Minute
GVZ	Galvanized
GSWC	Golden State Water Company
HDPE	High Density Polyethylene
HGE	Hydraulic Grade Elevation
HGL	Hydraulic Grade Line
HP, hp	Horsepower
HWL	High Water Level
in	Inch
IROD	Iterim Record of Decision
JWPCP	Joint Water Pollution Control Plant
KWB	Kern Water Bank
Key Well	Baldwin Park Key Well
LACFCD	Los Angeles County Flood Control District
LACSD	Los Angeles County Sanitation District
LF	Lineal Feet
LoF	Likelihood of Failure
LGAC	Liquid Granular Activated Carbon
Main Basin	Main San Gabriel Basin
MCL	Maximum Contaminant Level
MCLG	Federal Maximum Contaminant Level Goal
MDD	Maximum Day Demand
MG, mg	Million Gallons
MGD, mgd	Million Gallons per Day
mg/l	Milligrams per Liter or Parts per Million
ML&CSP	Mortar Lined and Coated Steel Pipe
MTBE	Methyl Tertiary Butyl Ether
MWD	Metropolitan Water District of Southern California
NAVD	National American Vertical Datum
NDMA	Nitrosodimethylamine
NL	Notification Levels
O&M	Operation and Maintenance
OSHA	Occupational Safety & Health Administration

**Table 1-1 (continued)
Abbreviations**

Abbreviation	Explanation
OSY	Operating Safe Yield
OU	Operable Unit
PCE	Tetrachloroethylene
PCCP	Pre-Cast Concrete Pipe
PDL	Pressure Data Logger
PDR	Preliminary Design Report
PFAS	Polyfluoroalkyl Substances
PHG	Public Health Goal
ppm	Parts per Million
PRS	Pressure Regulating Station
PRV	Pressure Reducing Valve
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
PVOU	Puente Valley Operable Unit
RL	Response Levels
RPM	Rotations per Minute
RSSCT	Rapid Small Scale Column Test
RSTL	Riveted Steel
RTS	Rediness-to-Serve
RWFS	San Gabriel Valley Regional Recycled Water Supply Program Feasibility Study
SBx7-7	Senate Bill SBx7-7 or The Water Conservation Act of 2009
SCADA	Supervisory Control and Data Acquisition
SCAG	Southern California Association of Governments
SCCP	Steel Cylinder Concrete Pipe
SCE	Southern California Edison
SCWP	Safe Clean Water Program
SDCWA	San Diego County Water Authority
SDWA	Safe Drinking Water Act
SEMOU	South El Monte Operable Unit
SGVWC	San Gabriel Valley Water Company
SGVMWD	San Gabriel Valley Municipal Water District
SF	Square Feet
SJV Basin	San Joaquin Valley Groundwater Basin
SOI	Sphere of Influence
STL, stl	Steel
SWP	State Water Project
SWRCB	State Water Resources Control Board
SWSD	Semitropic Water Storage District

**Table 1-1 (continued)
Abbreviations**

Abbreviation	Explanation
TCE	Trichloroethylene
TCP	1,2,3-Trichloropropane
TDH	Total Dynamic Head
TDS	Total Dissolved Solids
THAAS	Total Haloacetic Acids
TOC	Total Organic Carbon
TTHM	Total Trihalomethanes
TVMWD	Three Valley Municipal Water District
µg/l	Micrograms per Liter or Parts per Billion
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
USGVMWD	Upper San Gabriel Valley Municipal Water District
UV	Ultraviolet
UVAOP	Ultraviolet Advanced Oxidation Processes
UWMP	Urban Water Management Plan
VFD	Variable Frequency Drive
VOCs	Volatile Organic Compounds
Watermaster	Main Basin Watermaster
WMP	Water Master Plan
WNOU	Whittier Narrows Operable Unit
WS, WSTL	Welded Steel
WQA	San Gabriel Basin Water Quality Authority

SECTION 2

WATER SERVICE AREA

2-1 Location

The City of Monterey Park is a developed suburban area located in the San Gabriel Valley, just east of Los Angeles. The City encompasses approximately 5,035 acres and the sphere of influence covers about 381 acres. As shown on Figure 2-1, Monterey Park is bounded by the City of Los Angeles to the northwest, the City of Alhambra to the north, the City of Rosemead to the northeast, unincorporated South San Gabriel to the east, the City of Montebello to the south, and unincorporated East Los Angeles to the southwest.

Monterey Park is easily accessible, lying adjacent to three (3) major highways: the Long Beach Freeway (I-710) to the west, the San Bernardino Freeway (I-10) to the north, and the Pomona Freeway (SR-60) to the south. The major roads within the City include Monterey Pass Road, Atlantic Boulevard, Garfield Avenue, Garvey Avenue, Riggan Street, and Portrero Grande Drive.

2-2 Topography and Geology

The topography varies throughout the City. The northeast portion of the City is generally flat. There are four separate hilly areas separated by valleys that provide for the major thoroughfares such as Atlantic Boulevard, Monterey Pass Road, and the Long Beach Freeway. The highest elevation in the City is about 702 feet, located at the easterly end of Sombrero Drive (site of Sombrero Reservoir and Pump Station). The lowest elevation is about 260 feet at the southern border of the City along Pomona Boulevard.

The soil types throughout the City are shown on Figure 2-2, as provided by the City via their geology and soil GIS information. The areas of the City lying at lower elevations consist of primarily alluvium (deposits of silt, sand and gravel). The areas at higher elevations consist of “Repetto” Marine Claystone and nonmarine sandstone and conglomerate.

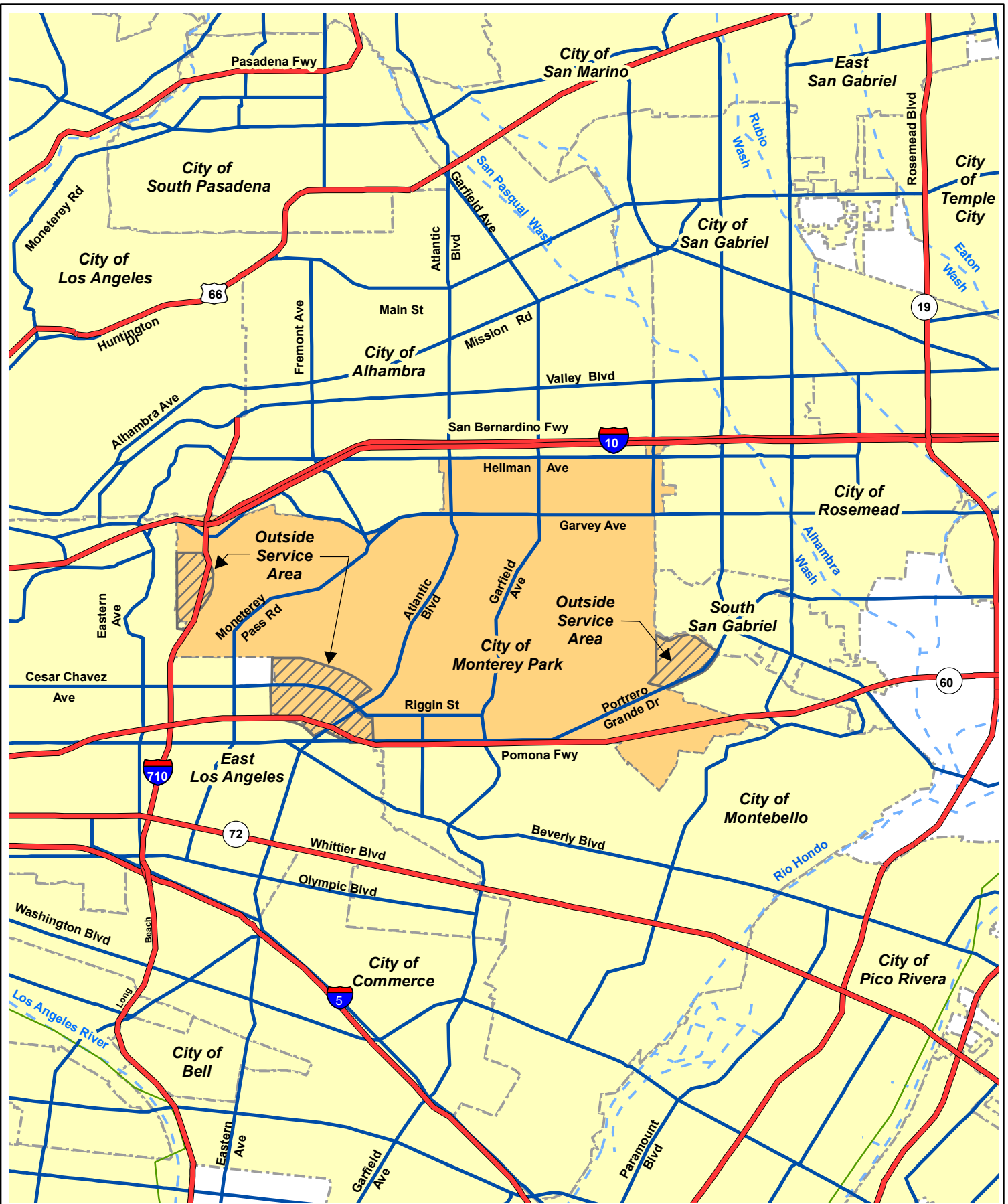
2-3 Climate

The climate in the area is typical of Southern California with generally mild temperatures, virtually no days below freezing, and plenty of sunshine throughout the year. The warmest months are typically experienced in August with an average maximum temperature of 90° F. The coolest months are typically experienced in December and January with an average minimum temperature of 47° F.

Rainfall at the Los Angeles County Department of Public Works, Montebello Fire Station 391C between 2000 and 2023 is shown in Figure 2-3. The average annual rainfall of about 12.3 inches occurred primarily during the winter months, between December and March.

The state of California declared a Drought State of Emergency on January 17, 2014 as rainfall and snowfall in the state had been well below average during prior years. Even though the drought was officially declared at an end on April 7, 2017, rainfall and snowfall levels continued to remain low until rain year 2018-2019 when California experienced an unusually wet year. Again, there was minimal rain in several subsequent years until rain year 2022-2023.

Climate change is expected to result in more variable weather patterns throughout California in the future. This variability may lead to longer and more severe droughts and floods, which will present significant challenges to California water supply conditions.



Not to scale



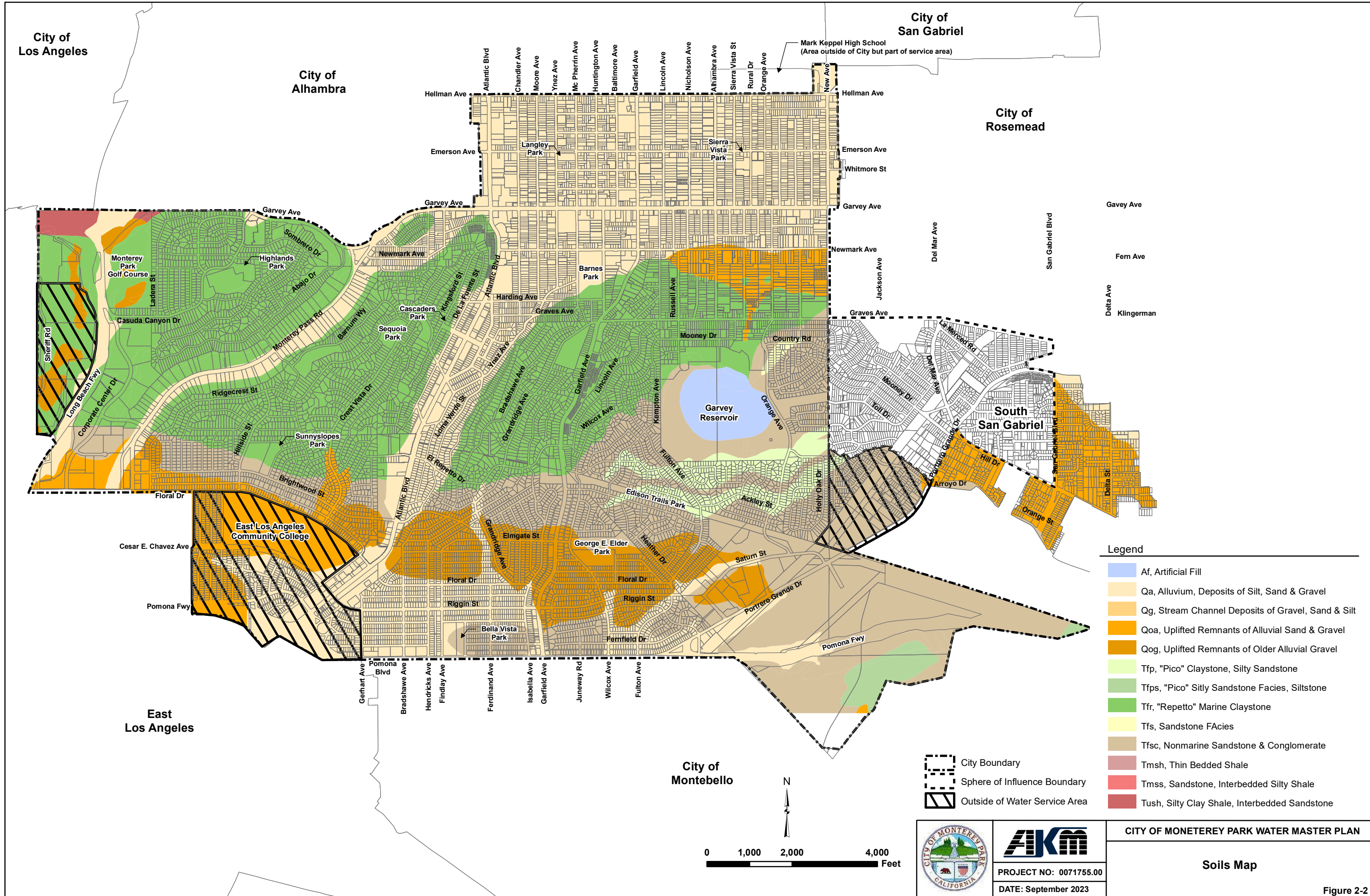
PROJECT NO: 0071775.00

DATE: June 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

Regional Location Map

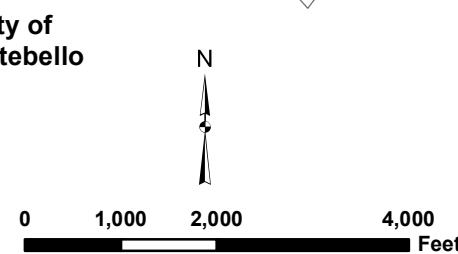
Figure 2-1



Legend

	Af, Artificial Fill
	Qa, Alluvium, Deposits of Silt, Sand & Gravel
	Qg, Stream Channel Deposits of Gravel, Sand & Silt
	Qoa, Uplifted Remnants of Alluvial Sand & Gravel
	Qog, Uplifted Remnants of Older Alluvial Gravel
	Tfp, "Pico" Claystone, Silty Sandstone
	Tfps, "Pico" Silty Sandstone Facies, Siltstone
	Tfr, "Repetto" Marine Claystone
	Tfs, Sandstone FACies
	Tfsc, Nonmarine Sandstone & Conglomerate
	Tmsh, Thin Bedded Shale
	Tmss, Sandstone, Interbedded Silty Shale
	Tush, Silty Clay Shale, Interbedded Sandstone

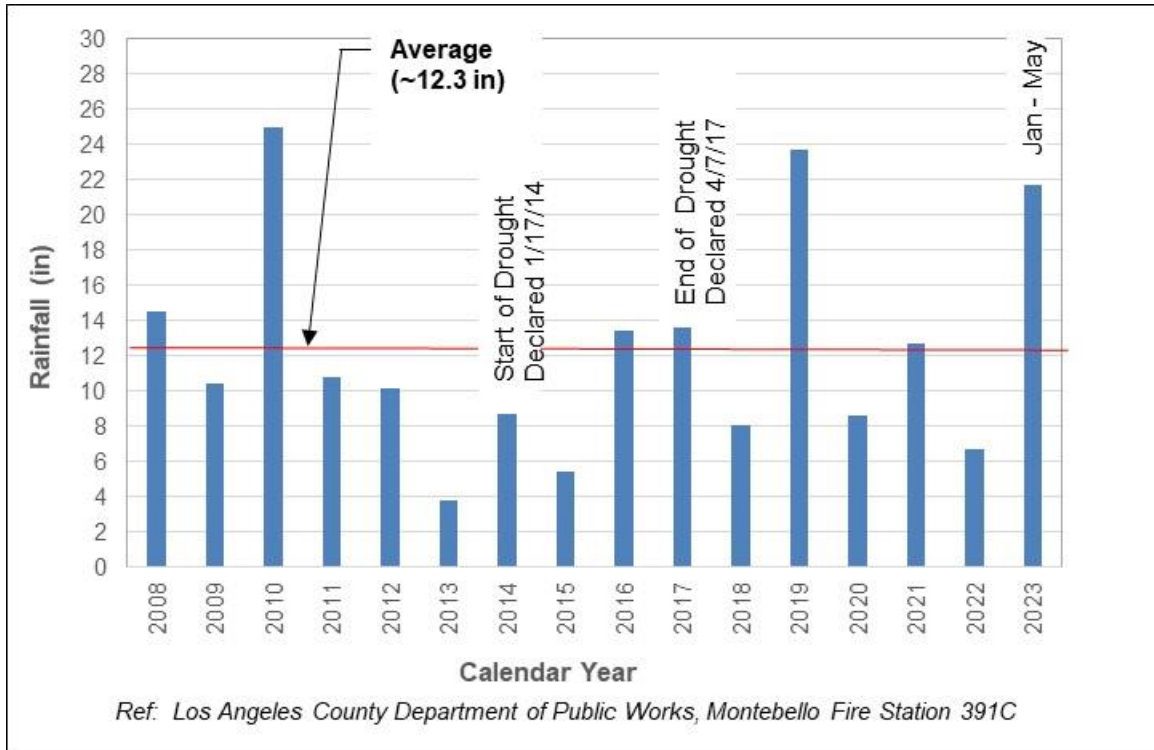
- City Boundary
- Sphere of Influence Boundary
- Outside of Water Service Area



AKM
 PROJECT NO: 0071755.00
 DATE: September 2023

CITY OF MONTEREY PARK WATER MASTER PLAN
Soils Map
 Figure 2-2

**Figure 2-3
Rainfall 2008-2023**



2-4 Water Service Area

The water service area generally coincides with the City’s corporate boundaries with four exceptions as follows:

1. Mark Keppel High School, located north of Hellman Avenue and west of New Avenue, is outside the City limits but is served by the City’s water system.
2. In the northwest portion of the City, the area south of the Sheriff’s Academy and west of Long Beach Freeway is not served by the water system. This area is served by California Water Services Company (CWSC).
3. In the southwest portion of the City, the East Los Angeles Community College (ELAC) and adjacent areas generally south of Floral Drive and west of Gerhart Avenue are generally served by California Water Services Company (CWSC). There is a 16-inch water line, owned and operated by the City, that extends from the intersection of Brightwood Street and Cresta Vista Drive to ELAC, providing fire flow service. The City has recently entered an agreement to provide supplemental usage to this area as well.
4. In the east portion of the City, the area east of Alisar Avenue and north of Portrero Grande Drive is not served by the water system. This area is served by San Gabriel Valley Water Company (SGVWC).

The areas described above are shown on Figure 2-4.

2-5 Land Use

The land use information utilized in the preparation of the Water Master Plan is primarily based upon the City’s latest Land Use and Urban Design Element (adopted June 17, 2020) and the most recent GIS land use information. This information was supplemented by aerial photographs, field reviews, and information provided by City staff.

The City’s current Land Use and Urban Design Element guides the City to the year 2040, addressing land use, circulation, economic development, and related issues. The general plan study area includes the area of the City within its corporate limits as well as the area within its sphere of influence. The sphere of influence consists of the unincorporated community of South San Gabriel located adjacent the City’s eastern boundary between New Avenue and San Gabriel Boulevard. The area within the corporate boundaries is approximately 5,035 acres. The sphere of influence area is about 381 acres. The City is a well planned urban community with a balance of residential, commercial, and industrial land uses. The location of these land uses is shown on Figure 2-4.

The water service area is approximately 4,198 acres as summarized in Table 2-1. About 55 percent of the water service area is made up of residential land uses and 45 percent of it made up of commercial, employment/technology, mixed use, open space, public facilities and right-of-ways.

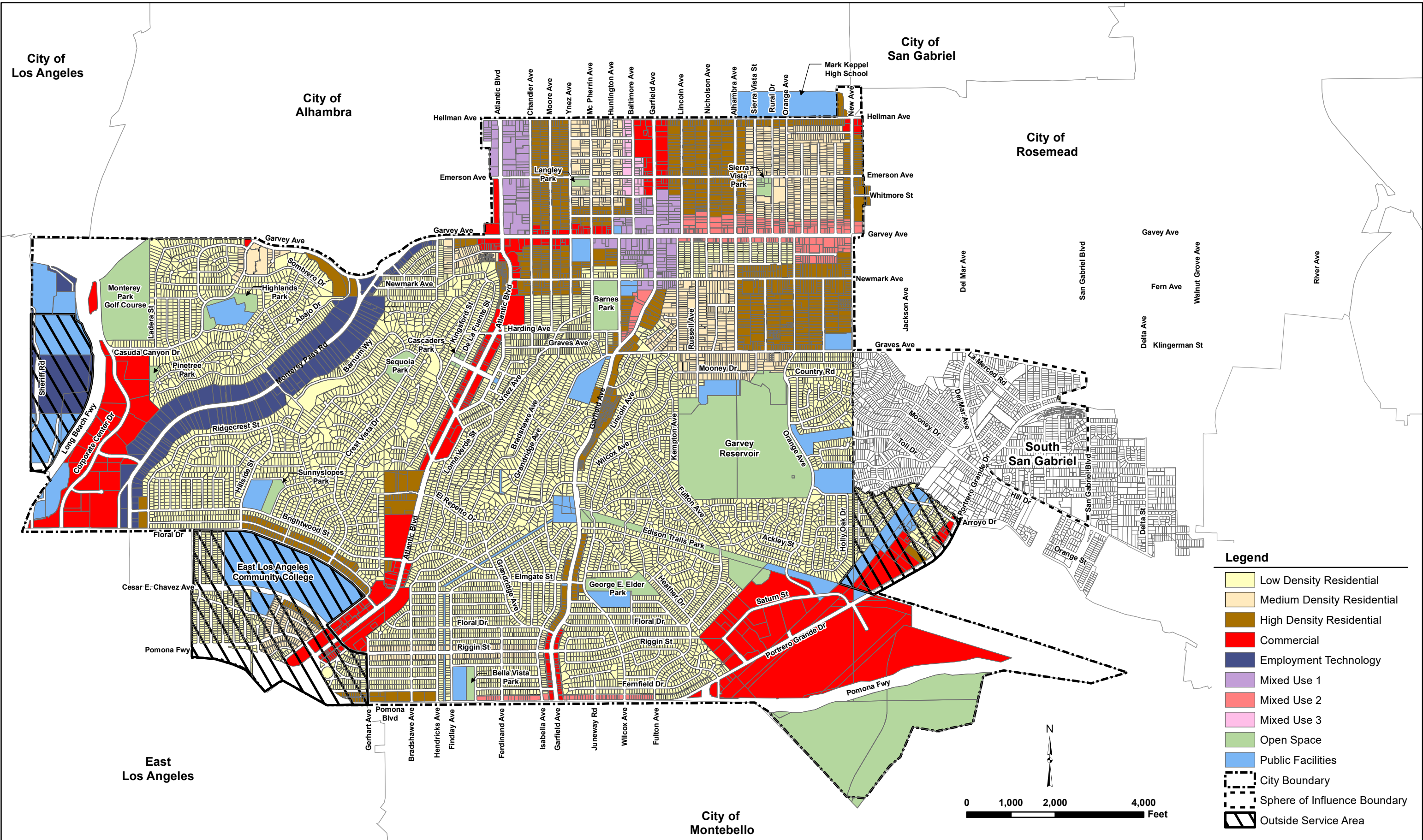
**Table 2-1
Water Service Area Land Uses**

Land Use	Water Service Area ¹	
	Acres	Percentage
Low Density Residential	1,673	39.9
Medium Density Residential	254	6.1
High Density Residential	380	9.1
Sub-total Residential	2,307	55.0
Commercial	465	11.1
Employment/Technology	141	3.4
Mixed Use I	90	2.1
Mixed Use II	62	1.5
Mixed Use III	11	0.3
Open Space	138 ²	3.3
Public Facilities	165 ³	3.9
Right-of-Ways	819	19.5
Sub-total	1,891	45.0
Total	4,198	100.0

¹ Acreages developed based on GIS landuse parcel file provided by City

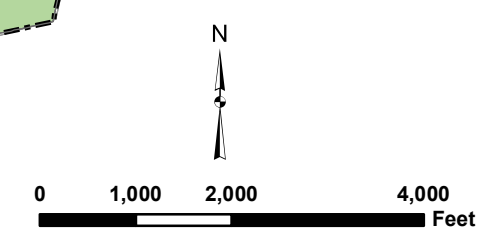
² Acreage does not include Garvey Reservoir, owned by Metropolitan Water District of Southern California



³ Acreage includes Mark Keppel High School (outside City boundary). Does not include ELAC.



Legend

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Employment Technology
- Mixed Use 1
- Mixed Use 2
- Mixed Use 3
- Open Space
- Public Facilities
- City Boundary
- Sphere of Influence Boundary
- Outside Service Area



		<p>CITY OF MONTEREY PARK WATER MASTER PLAN</p> <p>Land Use Map</p>
<p>PROJECT NO: 0071775.00</p> <p>DATE: September 2023</p>		<p>Figure 2-4</p>

The land use designation categories and their primary uses are shown in Table 2-2.

**Table 2-2
Land Use Designations and Uses**

Land Use Designation and Uses		Development Limits
Residential	Primary Use	Density Range
Low Density	One residential unit per lot, with private open space	0-8.0 units/acre Approximate population density = 25 persons/acre
Medium Density	Attached or detached residential units, with private and common open space	8.1-16.0 units/acre Approximate population density = 61 persons/acre
High Density	Attached or detached residential units, with private and common open space	16.1-30.0 units/acre Approximate population density = 184 persons/acre
Commercial and Business	Primary Use	Support Uses
Commercial	Broad range of retail and service commercial uses, hospitality, entertainment, medical, and professional offices	Schools, public assembly uses, public utilities, community care facilities, and similar uses per zoning regulations
Corporate Center	Professional offices, hospitality, entertainment, and medical	Retail and service commercial uses
Innovation/Technology	Research and development, light manufacturing, service commercial, professional offices, entertainment, and breweries/wineries/distilleries	Trade and technical schools, public utilities, and similar uses per zoning regulations
Mixed Use	Primary Use	
Mixed Use	Broad range of retail and service commercial uses, hospitality, entertainment, medical, professional offices, and residential uses	No density maximum to provide flexibility in unit types and sizes.
Public Facilities and Open Space	Primary Use	Floor Area Ratio (FAR) Maximum
Public Facilities	Public buildings, childcare centers for City-supported programs, community gardens, public utility facilities, utility easements, reservoirs and wells, public schools, and similar uses of a public-serving nature	0.75 FAR maximum
Open Space	Parks and City-owned recreational facilities, community gardens, golf courses, and resource conservation areas	0.35 FAR maximum

2-6 Population

Since its incorporation in 1916, the City of Monterey Park has grown from a population of 4,108 to 61,057 in 2020 and then a slight decline to 59,288 in 2023 (CDF, 2023). The City’s population history is illustrated on Figure 2-5, which shows that the total population in the City has stayed relatively constant since 1990.

With the total number of housing units at approximately 21,615 and a 4.6 percent vacancy rate (CDF, 2023), the population per household is estimated to be 2.86.

The water service area population was estimated to be about 59,473 in 2020. Per the City’s 2020 Urban Water Management Plan, this estimate was developed using the Department of Water Resources online population tool.

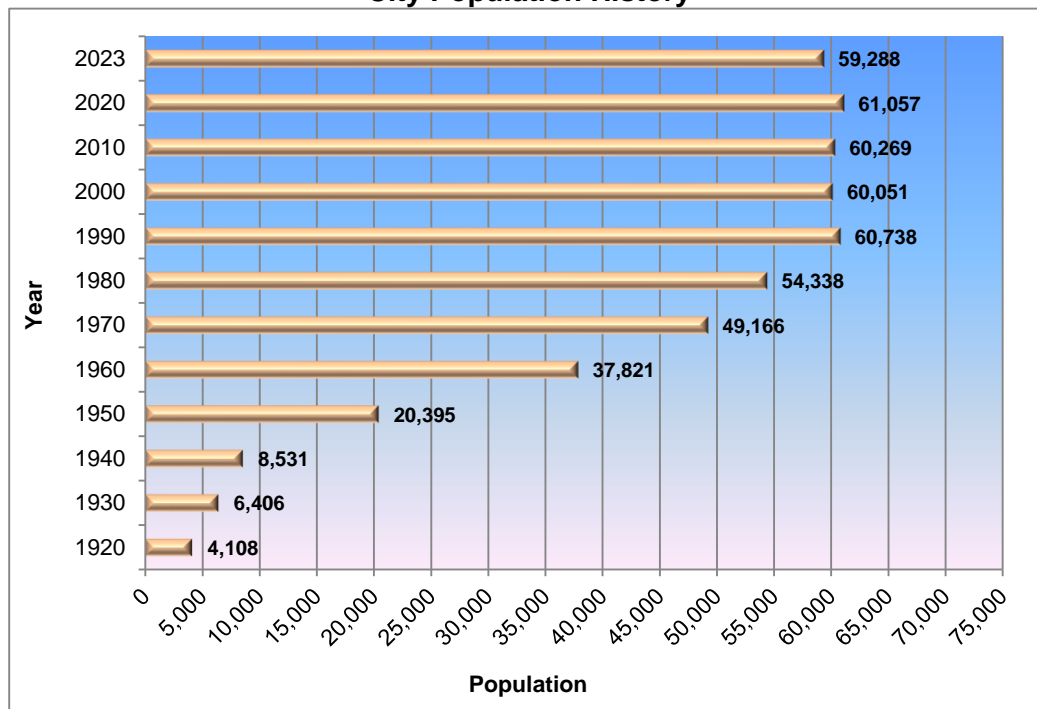
The projected service area population is estimated to reach 62,876 by the year 2045, as shown in Table 2-3. This is a total increase of 5.7 percent since 2020. The future population estimates were developed using Southern California Association of Governments (SCAG) growth rates and applying them to the 2020 population.

**Table 2-3
Estimated Service Area Population**

Year	Estimated Water Service Area Population ¹
2020	59,473
2025	60,138
2030	60,811
2035	61,492
2040	62,180
2045	62,876

¹ Ref: Population estimates per City of Monterey Park 2020 Urban Water Management Plan, Table 3-1 (Stetson, 2021)

**Figure 2-5
City Population History**



Reference: California Department of Finance, Demographic Research Unit, Table 2: E-5

SECTION 3

WATER SUPPLY ANALYSIS

3-1 Water Supply Sources

The City of Monterey Park (City) existing potable water supply consists almost entirely of groundwater from the City's twelve (12) wells produced from the Main San Gabriel Basin. Currently, only eight wells are active. Water can also be imported from the San Gabriel Valley Municipal Water District (SGVMWD or San Gabriel District). In FY 2019-20 the City pumped 7,434 acre-feet per year (AFY) from the groundwater basin and purchased 14 AFY of imported water from SGVMWD. The City is projected to utilize 8,421 AFY in 2025 and up to 8,804 AFY by 2045 with the anticipation that the purchasing of imported water will be kept to a minimum. This increase correlates with the projected 4.5% increase in population per Table 2-3.

3-1.1 Groundwater

The City has eight (8) active wells with a total capacity of 10,634 gpm (17,153 AFY). The City relies on groundwater produced from the Main San Gabriel Basin (Main Basin). The Main Basin (which is included as a subbasin of the San Gabriel Valley Basin, Basin Number 4-13 pursuant to DWR Bulletin 118) has been identified by Department of Water Resources (DWR) as a very low-priority groundwater basin partially due to the fact it is adjudicated. In that regard, the Main Basin is actively managed by the Main Basin Watermaster (Watermaster). Each year the Watermaster reviews water supply conditions including local rainfall, groundwater levels, local stormwater runoff available for replenishment, imported water availability and the amount of imported water stored in the groundwater basin for future demands. The Watermaster identifies the annual amount of groundwater which may be pumped (Operating Safe Yield) before more expensive imported water would need to be purchased from SGVMWD to replenish the Main Basin for all production in excess of the water rights, which currently is 5,088 AFY. As a component of the annual safe yield, any groundwater pumped via the City's groundwater rights will require coordination with SGVMWD for replacement water of the groundwater that is pumped in order to maintain the Main Basin. The Watermaster is not restricted as to when or how much untreated imported water be delivered to the Main Basin, only that it ultimately be delivered. In addition, the City has established an untreated imported water (cyclic) storage account in the Main Basin which the City may draw upon to offset its potential future production in excess of its water rights which currently is 5,088 AFY. In doing so, the City reduces its need to purchase untreated imported water in the future in the midst of a drought when imported water supplies may be limited. During the last five consecutive years of drought period, the City was able to increase its production of groundwater supplies from the adjudicated and managed groundwater basin.

The City is a member agency of the SGVMWD, a wholesale water agency. SGVMWD has a direct contract with the State of California for State Water Project (SWP) water. SGVMWD delivers the SWP water as "Supplemental Water" directly to the spreading grounds in the Main Basin. The SGVMWD provides Supplemental Water on behalf of the Cities of Alhambra, Azusa, Monterey Park, and Sierra Madre. SGVMWD prepared a 2020 Urban Water Management Plan (UWMP) which is incorporated in the City's 2020 UWMP by reference. In addition, the City provided its 2020 UWMP to SGVMWD which includes water use projections in five-year increments for a normal year, a single dry year, and a five consecutive year drought over the next 25 years .

3-1.2 Emergency Connections

The City has one active interconnection with SGVWC and four emergency interconnections with other agencies as referenced below. The SGVWC connection has a capacity of 4,000 gpm and is used to supply the City with water during high demand periods.

The emergency interconnections

are distribution system interconnections between water agencies for use during critical situations where one system or the other is temporarily unable to provide sufficient potable water to meet its water demands and/or fire protection needs. An emergency interconnection will allow a water system to continue serving water during critical situations such as local water supply shortages as a result of earthquakes, fires, prolonged power outages, and droughts.

1. The one-way emergency interconnection (Turnout MP-1) with Metropolitan Water District of Southern California (MWD) has a capacity of approximately 7,000 gpm (15.6 cubic feet per second (cfs)) and serves as a source of emergency supply for the City. The MWD connection is an extreme emergency source and would require additional preparations to be used by the City.
2. There is one-way emergency connection to supply the San Gabriel Valley Water District's system in the City of Montebello. It has an estimated capacity of 1,000 gpm.
3. There is a two-way emergency interconnection with the California Water Service Company, East Los Angeles (CWSC) that has an estimated capacity of 1,000 gpm.
4. There is also an emergency interconnection with Golden State Water Company, South San Gabriel (GSWC) to supply water to GSWC. It has an estimated capacity of 1,000 gpm.

3-1.3 San Gabriel Valley Water Company

The City can purchase local groundwater from San Gabriel Valley Water Company (SGVWC) by utilizing the one (1) active interconnection located at the Well 7 site. The City has a 10-inch interconnection with SGVWC, with a maximum capacity of 4,000 gallons per minute (gpm) or 9.0 cubic feet per second (cfs). The City purchases local groundwater from SGVWC as a supplemental water supply source during periods when the City's own water system is down due to maintenance or emergency repair. Since 2012, the City has purchased 0 AFY to 311 AFY, with an average of 96 AFY from SGVWC. The City's projected purchases from SGVWC, over the next 20 years in five-year increments, is to be 115 AFY from 2025 to 2045.

3-1.4 Current City Treatment Plants

The City's Delta Avenue Plant (Delta Plant) and all twelve (12) City-owned production wells are located in the San Gabriel Groundwater Basin. All 12 protection wells have been impacted by volatile organic compound (VOC) contamination.

The City's water system currently includes eight active wells: Wells 1, 3, 5, 9, 10, 12, 15 and Fern Well. There are four inactive wells which are Wells 6, 7, 8, and 14. All of the City's active wells, inactive wells and treatment facilities are located in the City of Rosemead. The City's three treatment facilities all located at the Delta Plant at which the following facilities are sited:

1. Wells 1, 3, 10, and Fern Treatment Facility

2. Wells 5, 9, 12 and 15 Treatment Facility
3. The Delta Settling Tanks Facility

Several of the City's production wells were impacted by VOCs at concentrations above their respective drinking water maximum contaminant level (MCL), forcing the City to take certain wells out of service and to construct a combination of wellhead treatment and centralized treatment facilities.

The City is the largest component of the South El Monte Operable Unit (SEMOU) "Interim Remedy," a regional hydraulic control program coordinated by the United States Environmental Protection Agency (EPA) and now the Department of Toxic Substances (DTSC) to contain VOC contamination in the SEMOU and remove contaminant mass from the affected aquifer. Two of the City's production wells (Wells 12 and 15) are EPA-designated "remedy wells" in the Central Containment Area of the SEMOU and another (Well 5) is an EPA-designated remedy well in the Western Containment Area. In addition, the wells feeding the Delta Plant have also been impacted by 1,4-dioxane and Per- and Polyfluoroalkyl substances (PFAS), which cannot be removed by the existing air stripping system liquid granular activated carbon (LGAC) treatment system.

Central Groundwater Treatment System

The Central Groundwater Treatment System (CGTS) project was initially started in 2016 to address the 1,4-dioxane issues along with the multitude of known VOC contaminants at one central treatment facility using the latest combination of technologies including ultraviolet advanced oxidation processes (UVAOP). The location selected was the City's existing Delta Plant. The City was awarded Prop 84 Integrated Regional Water Management funds to proceed with the design and construction of the CGTS to address the 1,4-dioxane and other known VOCs at the CGTS. Between 2016 and 2018, the City entered into a design-build contract and the design-build team constructed a new UVAOP system and refurbished an existing ion exchange system to be used with catalytic Granular Activated Carbon (CGAC).

Construction of the UVAOP and CGAC was completed in late 2018 and performance tests were conducted on the equipment. During that time, State Water Resources Control Board Division of Drinking Water (DDW) changed its treatment requirement for unregulated PFAS and the project startup and permitting process was halted. The City's supply wells (5, 9, 12 and 15) all had PFAS compounds at levels that would require treatment. Operation of the Delta Plant and wellhead treatment facilities has continued under the existing permit and the new UVAOP facility has been bypassed awaiting a solution to the PFAS.

In 2020, the City initiated multiple studies to determine the treatment approach and feasibility of addressing PFAS in the well water. The feasibility study showed that a UVAOP system followed by LGAC in a lead/lag operation would be the most appropriate and cost-effective treatment approach for the City. The feasibility study showed that refurbishing and relocating the existing Well 5 LGAC equipment to the Delta Plant would allow for maximizing the use of existing equipment and would save substantial capital costs. The second study was a Rapid Small Scale Column Test (RSSCT) to show effective removal of the PFAS compounds using a variety of LGAC from multiple manufacturers.

In early 2021, the Design-Build team initiated the design of the additional treatment system modifications at the CGTS to upgrade the system in 2022 the Design-Build team initiated the construction of the additional treatment system which is anticipated to be completed in late 2023. SWRCB DDW issued the permit for the new CGTS project and the existing Fern Treatment Plant on

March 20, 2023. The CGTS project will increase the flow of the Delta Plant to serve the needs of the City of Monterey Park.

The CGTS project has been planned in stages, with the initial stage (Stage 1) centralizing the treatment process by constructing the CGTS and increasing flow available from Wells 5, 9, 12 and 15. There are future plans for a second stage to expand the CGTS by adding additional treatment capacity and routing flow from Wells 1, 3, 10 and Fern to the CGTS. The third stage will route additional flow from Wells 7 and 8 to the CGTS, but will not expand treatment capacity.

The project will increase system efficiency by centralizing the treatment which will enable the City to increase the combined production from Wells 5, 9, 12, and 15 from 5,700 gpm to 7,400 gpm. Well 9 has the ability to pump to the CGTS as a standby measure but has to be operated under the permitted blending plan to address Arsenic. The primary element of the project was the design and construction of an UVAOP system consisting of a hydrogen peroxide dosing system followed by ultraviolet (UV) light treatment. Modifications at the Delta Plant to address PFAS will be made to the existing LGAC treatment infrastructure, relocation and refurbishment of the Well 5 LGAC system and addition of the new LGAC vessel. The addition of a new transmission pipe from Well 5 to the Delta Plant and well pump improvements at Well 5 were included in the UVAOP project. Planned removal of existing treatment infrastructure at each well site will take place at or near the end of the PFAS project. All treated water from CGTS is discharged into the Delta Settling Tanks for arsenic blending.

Wells 1, 3, 10 and Fern Treatment Plant

Water produced from Wells 1, 3, 10 and Fern is treated with the LGAC system for VOCs at the Delta Plant prior to being discharged into the Delta Settling Tanks. Treated water is then to be blended with water from the Delta Settling Tanks for perchlorate (if needed) and arsenic blending, and then discharged into the distribution system.

Delta Settling Tanks Arsenic Blending Facility

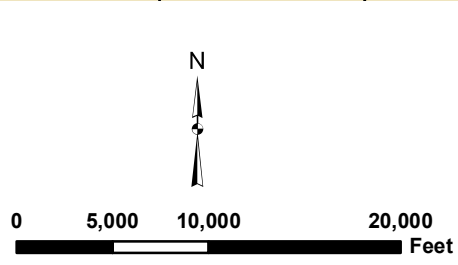
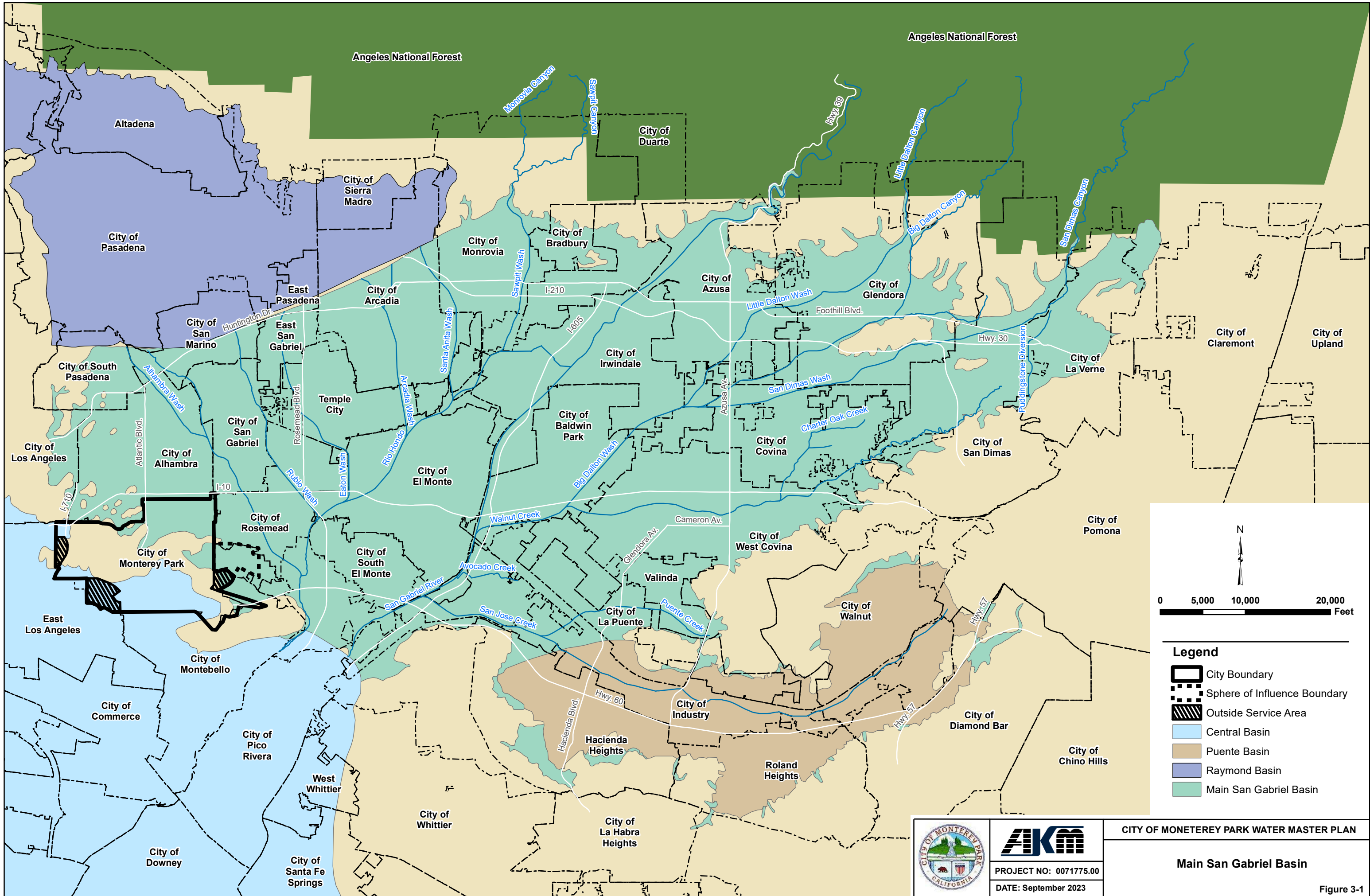
The Delta Settling Tanks receive water from the CGTS and the Fern Treatment Plant for arsenic blending and then discharged into the distribution system.

The groundwater availability is a function of plant flow and well combination which will varies. The total capacity of the eight (8) wells outlined above is 12,800 gallons per minute (gpm).

3-2 Existing Groundwater Rights

The Main San Gabriel Basin (Main Basin) lies in eastern Los Angeles County, California. The watershed coincides with a portion of the upper San Gabriel River watershed, and the groundwater basin underlies most of the San Gabriel Valley. The surface area of the Main Basin is approximately 167 square miles. The Main 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 watershed is drained by the San Gabriel River and Rio Hondo, a tributary of the Los Angeles River. Figure 3-1 provides an overview of the Main Basin.

The City has rights to pump groundwater from the Main Basin, which involves extensive governance and monitoring overseen by the Main San Gabriel Basin Watermaster (Watermaster), legal compliance, and ultimately usage by the Pumpers. The following is a summary of the Main Basin water rights and the associated tools that allow navigation for the extraction of groundwater from the Main Basin.



- Legend**
- City Boundary
 - Sphere of Influence Boundary
 - Outside Service Area
 - Central Basin
 - Puente Basin
 - Raymond Basin
 - Main San Gabriel Basin



AKM
 PROJECT NO: 0071775.00
 DATE: September 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

Main San Gabriel Basin

Figure 3-1

3-2.1 Judgements

Two main judgements dictate pumping from the Main Basin are as follows:

- *Long Beach Judgement.* The Long Beach Judgement was established in September 1965. This judgement requires that the area downstream from Whittier Narrows Dam (Lower Area) receive an annual usable quantity of water from the San Gabriel River system made up of surface flow, subsurface flow and any water exported to the Lower Area. Any deficiency of usable water to the lower area is guaranteed by the Upper Area through the form of imported water purchased by the Watermaster. The Long Beach Judgement also mandated oversight management through the formation of the San Gabriel River Watermaster which is a separate entity from the Main Basin Watermaster. The two Watermasters work collaboratively to ensure compliance with the Long Bach Judgement (*Stetson, 2021*).
- *Main Basin Judgement.* The Main Basin Judgement was entered into in January 1973. This Judgement resulted in the adjudication of the Main Basin. The Main Basin Judgement provides for the replacement of water extracted from the Main Basin beyond a Party's annual right established as part of the adjudication. The Main Basin Judgement is overseen by the Watermaster. The Watermaster establishes an annual Operating Safe Yield (OSY) which defines the maximum quantity of water each pumper is allocated to pump free of a replacement water assessment. If a Pumper pumps beyond its allocation, it must provide Supplemental Water that is spread into the Main Basin and pay the associated replacement water assessment (*Stetson, 2021*).

3-2.2 Main San Gabriel Basin Watermaster

The Main San Gabriel Basin Watermaster (Watermaster) is a nine member board which administers the water rights and manages the water quality and supply of the Main Basin. The Watermaster operates under a formal set of Rules and Regulations that define the procedures by which the Main Basin is operated and managed. Water producers must obtain Watermaster approval for constructing or modifying a well, constructing groundwater extraction system, spreading water in the Main Basin, and spreading and storing supplemental water under a cyclic storage agreement.

The Watermaster's primary responsibilities include the following:

1. Manage and control the withdrawal and replenishment of water supplies in the Main Basin
2. Determine annually the Operating Safe Yield and notify the pumpers of their shares thereof
3. Acquire and spread replacement water as needed
4. Coordinate local involvement in efforts to preserve and restore the quality of groundwater in the Main Basin
5. Assist and encourage regulatory agencies to enforce water quality regulations affecting the Main Basin
6. Collect production, water quality, and other relevant data from producers
7. Prepare an annual report of Watermaster activities, including financial activities, and summary reports of pumping and diversion

3-2.3 San Gabriel Basin Water Quality Authority

In 1993, the California Legislature established the San Gabriel Basin Water Quality Authority (WQA) to address the groundwater contamination in the San Gabriel Valley by developing, financing, and

implementing groundwater treatment programs in the San Gabriel Basin. The WQA board is comprised of one member from each of the three overlying municipal water districts, one from a city with prescriptive water pumping rights and one from a city without prescriptive water pumping rights, and two members representing water producers in the Main Basin. The three municipal water districts are: San Gabriel Valley Municipal Water District (SGVMWD), Three Valleys Municipal Water District (TVMWD), and Upper San Gabriel Valley Municipal Water District (USGVMWD).

With VOC's and nitrates (primarily used for fertilizers during the agricultural period) being found in the past, the Main Basin requires careful monitoring and treatment before its water can be served for domestic use. Other contaminants that have been detected more recently in the Main Basin include 1,4-Dioxane (a stabilizer for chlorinated solvents), N-Nitrosodimethylamine (NDMA - associated with rocket fuel), 1,2,3-Trichloropropane (TCP), and Chromium VI.

WQA projects have been responsible for removing nearly 45 tons of contaminants since 1993. It currently operates the only 1,4-Dioxane groundwater cleanup projects in the San Gabriel Valley that actively prevents contamination from reaching deeper zone production wells.

3-2.4 Safe Yields and Water Rights

The OSY defines the amount of groundwater each Pumper within the Main Basin can pump free of being charged the replacement water assessment. The Main Basin is estimated to have approximately 8.7 million acre-feet of usable storage based on a 1916 groundwater elevation of 329 feet at the Baldwin Park Key Well (Key Well). While this is an extraordinary amount of storage, and like all groundwater basins, it must be monitored, managed, and pumping limitations must be enforced to ensure the overall health of the Main Basin and associated groundwater levels.

There are several critical factors in the OSY calculation that determine the annual amount of water that can be extracted by the Pumpers from the Main Basin. These factors include the current and projected groundwater elevation at the Key Well, which represents the water stored in the Main Basin. A one-foot change in elevation at the Key Well represents approximately 8,000 acre-feet of stored water (refer to Section 3-3 for more details on Main Basin Storage). Other factors included in the OSY calculation include consideration of Main Basin hydrologic conditions (e.g., rainfall, storage of local run-off in surface reservoirs, conservation, stormwater runoff, etc.), availability of Supplemental Water Cyclic Storage quantities, and Carry-over Rights. Since 1973 the OSY has ranged from a maximum of 240,000 acre-feet per year (years 2005-2006) to a low of 130,000 acre-feet per year, recently adopted by the Main Basin Watermaster for fiscal years 2023 through 2027.

The City's groundwater right of the established OSY is 3.3920 percent which yields a pumping right of 5,088 acre-feet per year through fiscal year 2027. This pumping right over the next four (4) years is below the City's pumping capacity of 17,153 AFY, referenced in Section 3-1.1. The higher the OSY, the greater the City's groundwater pumping right. The City's pumping rights since 2000 in association with the established OSY and the future OSY for fiscal years 2023 to 2027 is shown in Table 3-1.

In May 2021, the Watermaster conducted a public hearing and subsequently established the OSY at 150,000 acre-feet for Fiscal Year 2021-22 (*SGWM, 2022*).

Over the past 10 years the City's average Main Basin entitlement has been reduced by approximately 2,402 acre-feet per year or 31%. The Water Master is collaboratively managing the Main Basin health to ensure longevity of future water supplies with several competing challenges (e.g., increased

demands, drought, etc.). This decrease will result in the pumping of additional groundwater at an increased cost due to the replacement water assessment and/or use of more imported water.

**Table 3-1
Historical City Basin Entitlements**

Fiscal Year	Main San Gabriel Basin Operating Safe Yield (AF)	City of Monterey Park		
		Basin Entitlement (AF)	Production (AF)	Replacement Water Need to be Purchased (AF)
2000-01	220,000	8,628	10,308	1,680
2001-02	210,000	8,235	10,470	2,235
2002-03	190,000	7,451	179	2,728
2003-04	170,000	6,667	10,253	3,586
2004-05	170,000	6,667	9,966	3,299
2005-06	240,000	9,412	10,439	1,027
2006-07	240,000	9,412	11,018	1,606
2007-08	210,000	8,235	10,063	1,828
2009-10	180,000	7,059	9,501	2,442
2010-11	170,000	6,667	8,686	2,019
2011-12	170,000	6,667	8,497	1,830
2012-13	200,000	6,784	8,834	2,050
2013-14	150,000	6,106	9,025	2,919
2014-15	150,000	4,829	8,140	3,311
2015-16	150,000	5,088	7,422	2,334
2016-17	150,000	5,088	7,536	2,448
2017-18	150,000	5,088	7,454	2,366
2018-19	150,000	5,088	7,321	2,233
2019-20	150,000	5,088	7,461	2,373
2020-21	150,000	5,088	7,595	2,507
2021-22	150,000	5,088	7,087	1,999
Average	177,143	6,592	8,441	2,325

3-2.5 Assessments

As a Pumper within the Main Basin, the City is required per the Main Basin Judgement to pay assessments to fund Main Basin management, administrative, and replenishment activities. The following is a summary of the various Main Basin assessments:

- **Administration Assessment.** This assessment is applied unilaterally across all Pumpers for every acre-feet of pumping from the Main Basin to support the administrative functions of the Water Master.
- **In-Lieu Assessment.** This assessment is applied to Pumpers who take imported water in-lieu of pumping their groundwater rights to assist in promoting health of Main Basin management to maintain groundwater levels in specific parts of the Main Basin.

- **Resource Development Assessment.** This assessment is applied unilaterally across all Pumpers for every acre-feet of pumping from the Main Basin to support the purchase of supplemental imported water to augment natural recharge for the benefit of the Main Basin.
- **Make-up Water Assessment.** This assessment is applied to all Pumpers when the required amount of water cannot be naturally delivered to the Lower Area as determined by the San Gabriel River Water Master.
- **Replacement Water Assessment.** This assessment is applied when a Pumper exceeds pumping beyond its allocated water right from the Main Basin.

Table 3-2 provides an overview of the fiscal years 2022-23 and 2023-24 Main Basin assessments. The City pays each of the respective assessments based on the conditions in which they pump groundwater. As long as the City stays within their pumping right allocation, the City pays the Resource Development Assessment and the Administration Assessment for a total of \$192 per acre-foot for fiscal year 2022. Pumping beyond the City’s groundwater right will cost \$1,091 per acre-feet in FY 2022-23.

**Table 3-2
Main Basin Assessments**

Assessment Description	FY 2022 (\$/AF)	FY 2023 (\$/AF)
Administration	\$17	Not Determined
In-Lieu	\$8	Not Determined
Resource Development	\$175	\$175
Make-Up Water	\$0	Not Determined
Replacement Water	\$899	\$955

3-3 San Gabriel Basin Hydrogeologic Conditions

In addition to the regional vastness of the Main Basin demonstrated on Figure 3-1, the Main Basin supports a robust hydrogeologic aquifer that allows tremendous storage of groundwater.

3-3.1 Basin Characteristics

The Main Basin is divided into two main parts, the Main Basin and the Puente Subbasin. While the Puente Subbasin is hydraulically connected to the Main Basin, it is not considered to be part of the Main Basin management and thus not under the purview of the Water Master. The Main Basin principal water-bearing formations are unconsolidated and semi-consolidated sediments which range in size from coarse gravel to fine-grained sands. While there are clay lenses throughout the Main Basin, there is not a uniform clay layer to form an impenetrable barrier. Thus, the Main Basin operates as an unconfined aquifer. The Main Basin ranges in depth from 800 feet (San Dimas area) above sea level to 2,200 feet below sea level (South El Monte area). Wells located in the deeper regions of the Main Basin have water bearing formations of approximately 4,000 feet and wells in the shallower regions have water bearing formations of approximately 200-300 feet. Wells located in the deeper formations provide greater yields than wells located in the shallower regions.

3-3.2 Flow Characteristics

Water flow within the Main Basin is generally from a northeasterly to southwesterly direction. The various faults influence how water moves throughout the Main Basin. The general direction of flow through the Main Basin is shown on Figure 3-2.

Water flows into the Whittier Narrows is governed by the Long Beach Judgement as discussed in Section 3-2.1. The natural flow tendency, permeability, and optimum soil conditions (e.g., sands and

gravels) of the Main Basin allows its Pumpers to produce cost effective water and allow the required amount of water to flow into the Lower Area.

3-3.3 Storage

Storage within the Main Basin is estimated to be approximately 8.7 million acre-feet per the 1916 groundwater elevation of 329 feet as measured at the Key Well, and as low as 7.4 million acre-feet per the 2018 groundwater elevation of 169.4 feet as measured at the Key Well. An overview of the Key Well groundwater elevations from 1997 to present is shown on Figure 3-3.

A key metric used by the Water Master in managing the Main Basin is to maintain a 200-foot groundwater elevation at the Key Well. There is a distinct correlation between the Key Well elevation and sufficient water supplies for Pumpers to maintain a high OSY to maximize their pumping right allocations each year (refer to Table 3-1). As seen on Figure 3-2, groundwater levels in the Key Well clearly diminish in drought years such as 2015. The OSY was reduced from 180,000 acre-feet in 2014 to 150,000 acre-feet in 2015 and beyond. Reduced groundwater levels and associated OSY has a direct effect on the City's ability to pump cost-effective groundwater.

3-3.4 Main Basin Replenishment

The Main Basin has four major sources of replenishment. These sources include incidental rainfall recharge throughout the San Gabriel Valley, stormwater recharge through percolation, imported water recharge through percolation via spreading grounds, and natural river recharge along the various rivers and tributaries. Stormwater capture and recharge and imported water recharge are performed via spreading basins across the Main Basin and are operated by the Los Angeles County Department of Public Works. Some spreading basins are multi-purpose and can spread both imported water and captured stormwater, while others are used purely for imported water.

The ability to measure groundwater recharge quantities is difficult, thus requiring estimates for many of the recharge activities. Imported water recharge is performed with somewhat of a quantifiable amount due to the metering of imported water. Stormwater capture is performed with a rough estimate as stormwater is captured and released in measured quantities. The Main Basin Water Master provides an overall recharge amount to the Main Basin each year knowing that it is a rough estimate and relies heavily on the Key Well elevation to determine the overall health of the Main Basin. Since 1973, it is estimated that approximately 7.5 million acre-feet has been recharged into the Main Basin through natural recharge, treated groundwater clean-up, cyclic storage, and resource development water recharge. The Water Master estimates that historical stormwater recharge has been reduced over the past decade on average from 111,000 acre-feet per year to approximately 55,000 acre-feet per year making it essential to find other water sources to make-up this shortfall.

Each of the Main Basin imported water wholesalers (Three Valleys Municipal Water District (TVMWD), San Gabriel Municipal Water District (SGVMWD), and the Upper San Gabriel Municipal Water District (USGVMWD)) have cyclic storage agreements with the Water Master to purchase and store untreated imported water when it becomes available to help offset the cost impacts of having to purchase replacement water. Many of the Pumpers also have individual cyclic storage agreements. Cyclic storage results in an overall benefit to the Main Basin with increasing groundwater levels and lower operating costs to Pumpers

Figure 3-2
Main Basin Groundwater Flow

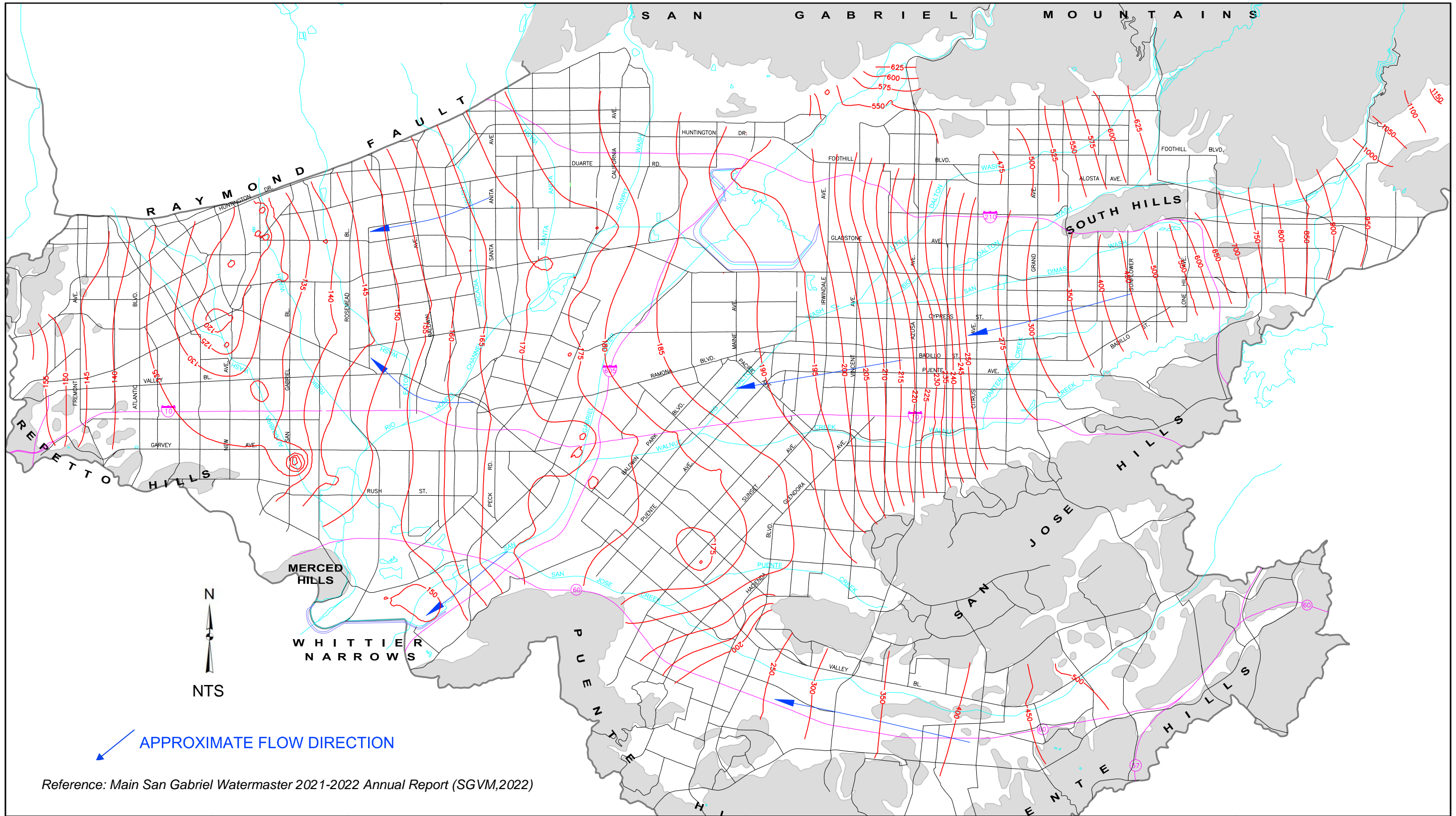
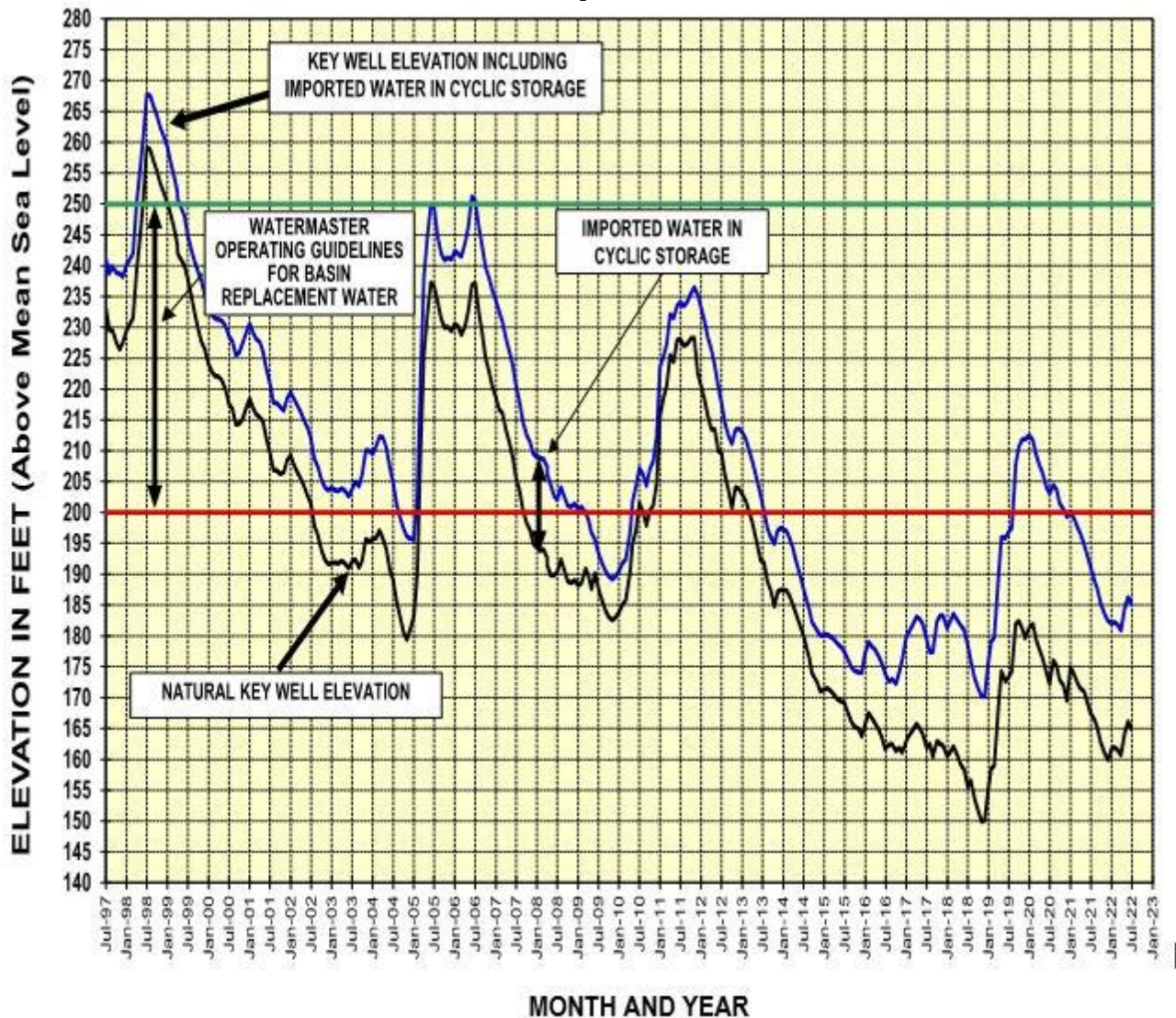


Figure 3-3
Baldwin Park Key Well Elevations



Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

3-3.5 Groundwater Quality

The groundwater contamination is from ground disposal of volatile organic compounds (VOCs), dating back to World War II. VOCs were used primarily as solvents in industrial and commercial activities. Discovery of VOCs in 1979 led to further testing and ultimately resulted in the Main Basin being designated as a Superfund site in 1984. Federal and state regulators have spent years characterizing the contamination, identifying Responsible Parties, and developing remediation plans. The United States Environmental Protection Agency (USEPA) constructed several treatment facilities (operable units) in areas of contamination in the Main Basin as follows:

- Baldwin Park Operable Unit (BPOU)
- El Monte Operable Unit (EMOU)

- South El Monte Operable Unit (SEMOU)
- Puente Valley Operable Unit (PVOU)
- Whittier Narrows Operable Unit (WNOU)
- Area 3 Operable Unit (Alhambra/San Gabriel area)

As part of its effort to characterize and remediate these groundwater impacts, the U.S. Environmental Protection Agency (EPA) implemented a series of “operable units” (OUs) in the Main Basin, one of which is the SEMOU, where the City’s production wells are located (Figure 3-4). Groundwater in the SEMOU has been contaminated with VOCs as well as perchlorates and 1,4-Dioxane. In its Interim Record of Decision (IROD) (*USEPA, 2000*) for the SEMOU, EPA selected a remedy requiring hydraulic containment in a “Central Containment Area” and a “Western Containment Area” (EPA, September 2000). The approximate boundaries of these two “containment areas” are shown on Figure 3-4 and, at a larger scale, on Figure 3-5 (*Miller, 2022*).

In broad terms, EPA’s model shows that the capture zones that develop around Wells 5, 12, and 15 (and the remedy wells at SGVWC’s Plant 8) overlap to varying degrees and extend to the southeast before gradually curving to the east. EPA models capture in the upper, middle, and lower Intermediate Zone separately and under different starting water level conditions; however, combined/simplified capture zones are shown on Figure 3-6 (*Miller, 2022*). The extraction rates modeled by EPA are lower than the rates the City plans to extract, particularly for Well 5; however, the capture zones depicted on Figure 3-6 are considered broadly representative.

The City’s 2022 Water Quality Report is shown in Table 3-3 and available via the City’s website at <https://www.montereypark.ca.gov/DocumentCenter/View/14602>

3-4 Potential Local Groundwater Supply Development

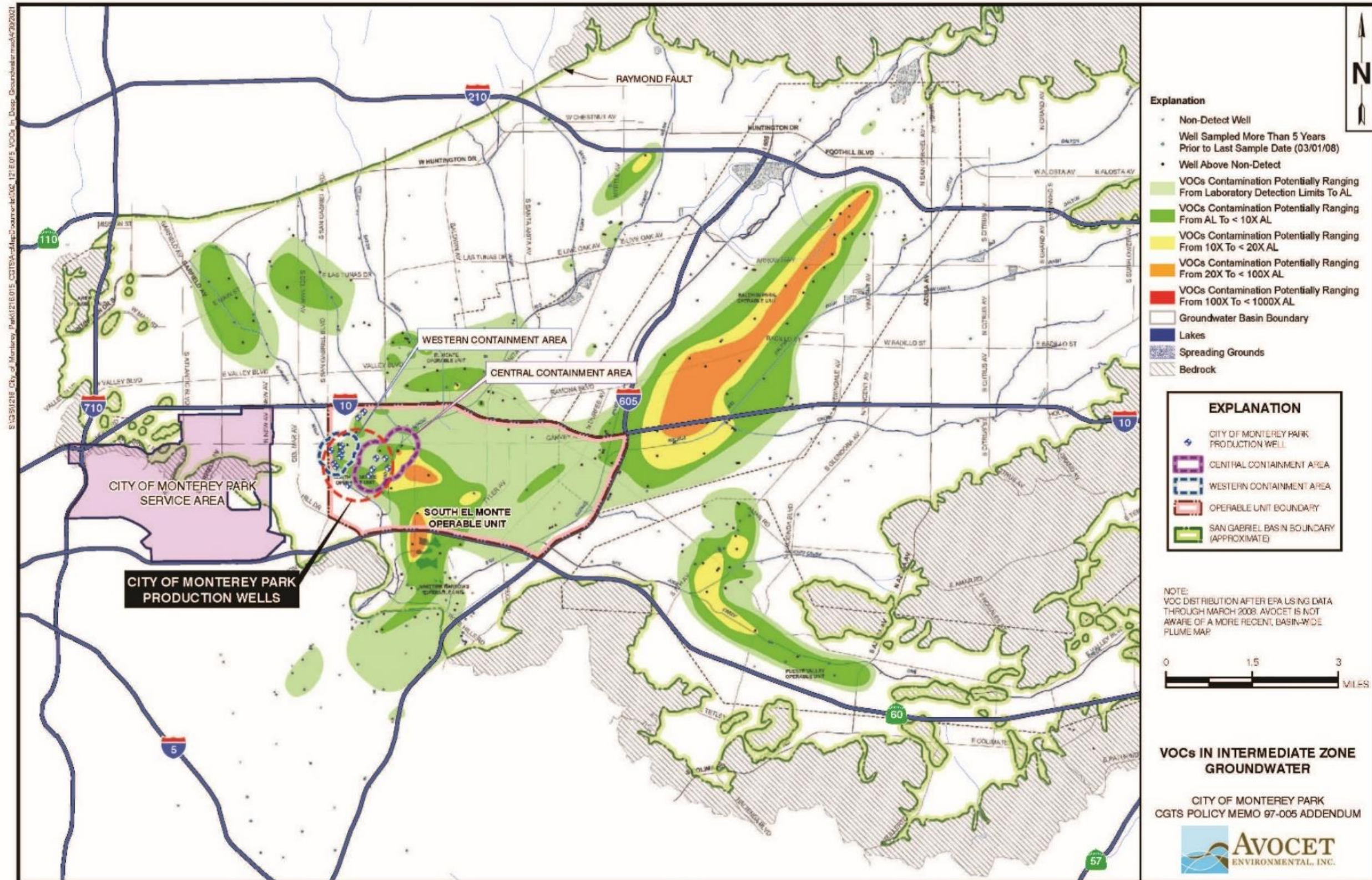
The City’s existing average day water demands of 7,333 AFY and maximum day water demands of 10,633 AFY which is outlined in detail in Section 4 – Water Use. The current well production capacity is 17,153 AFY per efficiency tests. With the increasing cost of imported water and increasing demands, it is advantageous for the City to maximize its groundwater pumping to meet the average day and peak season demands through enhanced groundwater pumping and evaluate other groundwater supply development options. Groundwater Supply Development Options are discussed below.

3-4.1 Pure Water Southern California

This project will allow utilization of the City’s full adjudicated water rights when the Pure Water Southern California Project (Pure Water SoCal Project) extension to the area is completed. The Pure Water SoCal Project is a regional recycled water program led by Metropolitan Water District of Southern California (MWD) that will provide up to 150 million gallons per day of treated Title 22 recycled water to the MWD service area from the Los Angeles County Sanitation District’s Joint Water Pollution Control Plant (JWPCP) located in Carson California. The tentative alignment and quantities that will be distributed throughout the MWD service area to select locations and Main Basin are shown on Figure 3-7.

The Main Basin Water Master has indicated that up to 80,000 AFY of additional recharge into the Main Basin could be accepted. An additional benefit of this project is that it will increase the reliability of groundwater supplies and reduce the emergency storage needs for the system. Section 3-6.1.2 provides an overview of the Pure Water Project.

Figure 3-4
VOC Containment in Intermediate Areas



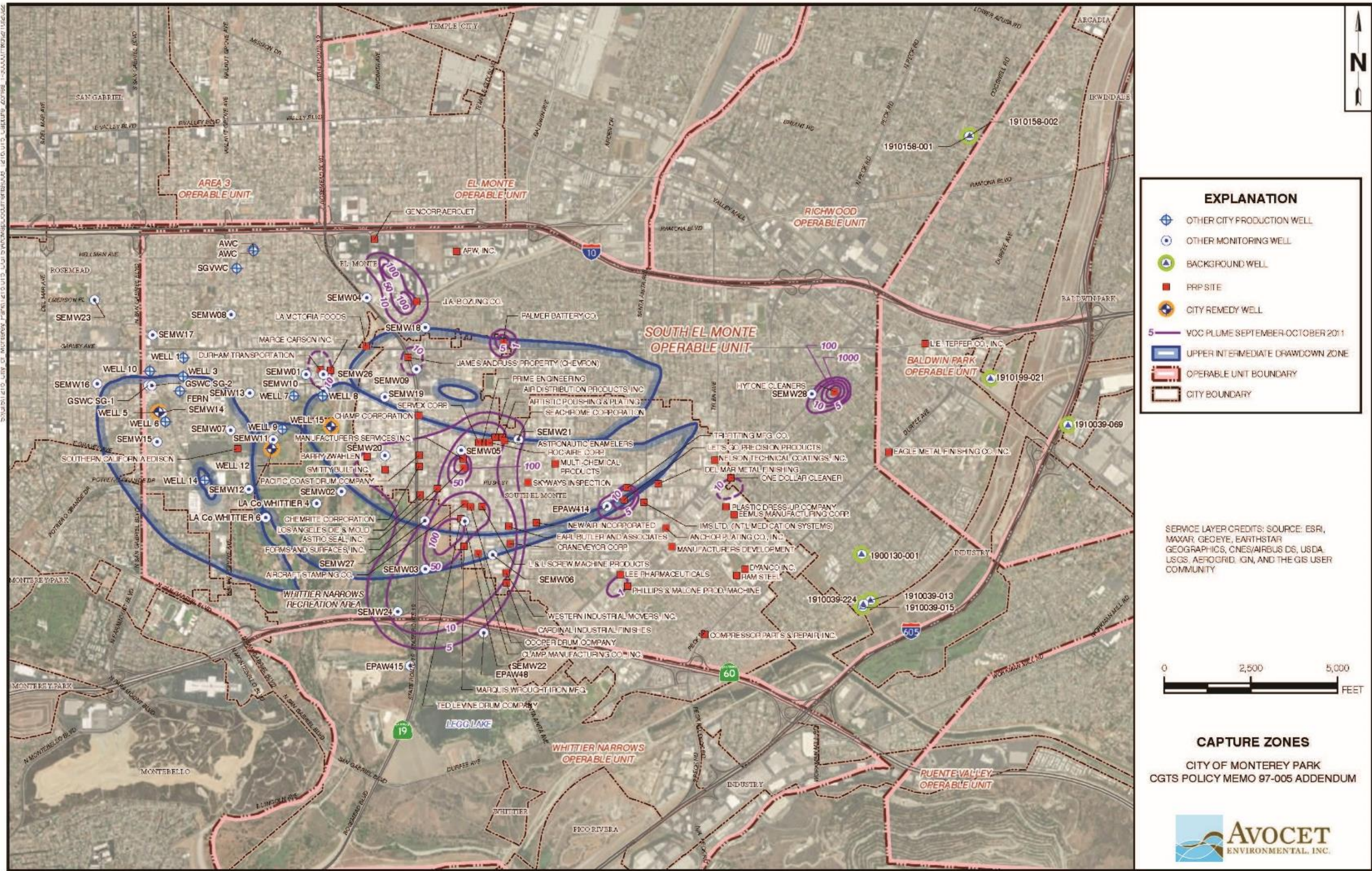
Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

Figure 3-5
Delta Plant and Vicinity



Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

Figure 3-6
Capture Zones



Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

**Table 3-3
City of Monterey Park 2022 Water Quality**

CONSTITUENT AND (UNITS)	MCL or [MRDL]	PHG or (MCLG) [MRDLG]	DLR	City of Monterey Park Groundwater			SGVWC Groundwater (a)			TYPICAL ORIGINS
				Results (b)	Range (Min - Max)	Most Recent Sampling	Results (b)	Range (Min - Max)	Most Recent Sampling	
PRIMARY DRINKING WATER STANDARDS--Health-Related Standards										
MICROBIOLOGICAL										
<i>E. coli</i>	(c)	(0)	n/a	0 (highest number of detections)	0 (Number of months in violation)	Weekly	--	--	--	Human and animal fecal waste
DISINFECTANT AND DISINFECTION PRODUCTS (d)										
Chlorine Residual (mg/l)	[4]	[4]	n/a	0.69	0.03 - 1.4	Weekly	--	--	--	Drinking water disinfectant added for treatment
Haloacetic Acids (HAA5) (µg/l)	60	n/a	1-2	2.2	ND - 3.3	Quarterly	--	--	--	Byproduct of drinking water disinfection
Total Trihalomethanes (TTHMs) (µg/l)	80	n/a	1	11	0.77 - 8.6	Quarterly	--	--	--	
INORGANIC CHEMICALS										
Arsenic (µg/l)(e)	10	0.004	2	<2	ND - 4	Weekly	ND	ND	2022	Erosion of natural deposits
Copper (mg/l) (f)	AL = 1.3	0.3	0.05	0.15	--	2021	--	--	--	Internal corrosion of household plumbing system
Fluoride (mg/l)	2	1	0.1	0.65	0.49 - 0.93	2022	0.57	0.41 - 0.78	2022	Erosion of natural deposits
Lead (µg/l) (f)	AL = 15	0.2	5	ND	--	2021	--	--	--	Internal corrosion of household plumbing system
Nitrate as N (mg/l)(g)	10	10	0.4	3.7	2 - 5.9	Weekly	2.5	0.23 - 4.7	2022	Runoff and leaching from fertilizer use
Perchlorate (µg/l)	6	1	2	<2	ND - 2	2022	ND	ND	2022	Discharge from industrial sources
RADIOACTIVITY										
Gross Alpha Activity (pCi/l)	15	(0)	3	4.4	ND - 11	2022	3.7	ND - 7.7	2022	Erosion of natural deposits
Combined Radium (pCi/l)	5	0	1	<1	ND - 1.2	2022	ND	ND	2016	
Uranium (pCi/l)	20	0.43	1	4.7	ND - 15	2022	6.5	1.9 - 10	2021	
SECONDARY DRINKING WATER STANDARDS--Aesthetic Standards, Not Health-Related										
Chloride (mg/l)	500	n/a	n/a	26	11 - 48	2021	20	3.8 - 34	2022	Runoff/leaching from natural deposits
Manganese (µg/l)	50	n/a	20	<20	ND - 39	2021	ND	ND	2022	Runoff/leaching from natural deposits
Odor (threshold odor number)	3	n/a	1	1.1	ND - 2	2021	1	1	2022	Naturally-occurring organic materials
Specific Conductance (µmho/cm)	1,600	n/a	n/a	570	300 - 980	2022	540	310 - 740	2022	Substances that form ions in water
Sulfate (mg/l) (h)	500	n/a	0.5	68	32 - 170	Weekly	66	20 - 110	2022	Runoff/leaching from natural deposits
Total Dissolved Solids (mg/l)	1,000	n/a	n/a	360	170 - 660	2022	350	180 - 490	2022	Runoff/leaching from natural deposits
Turbidity (NTU)	5	n/a	0.1	0.24	ND - 0.55	2021	<0.1	ND - 0.38	2022	Runoff/leaching from natural deposits
OTHER CONSTITUENTS OF INTEREST										
Alkalinity, total (mg/l as CaCO3)	n/a	n/a	n/a	150	77 - 220	2021	190	140 - 240	2022	Runoff/leaching from natural deposits
Boron (mg/l)	NL = 1	n/a	0.1	0.1	ND - 0.16	2018	--	--	--	Runoff/leaching from natural deposits
Calcium (mg/l)	n/a	n/a	n/a	54	11 - 97	2021	62	31 - 88	2022	Runoff/leaching from natural deposits
1,4-Dioxane (µg/l)	NL = 1	n/a	1	<1	ND - 1.6	2022	--	--	--	Discharge from industrial sources
Hardness as CaCO3 (mg/l)	n/a	n/a	n/a	200	31 - 380	2021	220	93 - 330	2022	Runoff/leaching from natural deposits
Hardness as grains per gallon	n/a	n/a	n/a	12	1.8 - 22	2021	13	5.4 - 19	2022	Runoff/leaching from natural deposits
Magnesium (mg/l)	n/a	n/a	n/a	16	0.84 - 33	2021	17	3.8 - 26	2022	Runoff/leaching from natural deposits
pH (pH units)	n/a	n/a	n/a	8.1	7.1 - 8.4	2021	7.8	7.4 - 8.2	2022	Hydrogen ion concentration
Sodium (mg/l)	n/a	n/a	n/a	41	28 - 64	2021	25	25 - 33	2022	Runoff/leaching from natural deposits
UNREGULATED CHEMICALS REQUIRING MONITORING										
Bromide (µg/l)	n/a	n/a	n/a	120	33 - 190	2019	--	--	--	Discharge from industrial sources
Manganese (µg/l) (i)	SMCL = 50	n/a	n/a	0.62	ND - 1.7	2019	--	--	--	Runoff/leaching from natural deposits
Total Organic Carbon (mg/l)	n/a	n/a	n/a	<1	ND - 1.4	2019	--	--	--	Various natural and man-made sources
UNREGULATED CHEMICALS REQUIRING MONITORING IN THE DISTRIBUTION SYSTEM										
Haloacetic acids (HAA5) (µg/l)	n/a	n/a	n/a	0.67	0.35 - 1.1	2019	--	--	--	By-products of drinking water disinfection
Haloacetic acids (HAA6Br) (µg/l)	n/a	n/a	n/a	0.88	0.35 - 1.7	2019	--	--	--	
Haloacetic acids (HAA9) (µg/l)	n/a	n/a	n/a	0.88	0.35 - 1.7	2019	--	--	--	

Reference: City of Monterey Park 2022 Annual Water Quality Report

Figure 3-7
MWD Pure Water Program

Up to 150 million gallons per day



Reference: Metropolitan Water District website for Pure Water Southern California: <https://www.mwdh2o.com/building-local-supplies/pure-water-southern-ca> (MWD, 2023)

3-5 Future Groundwater & Imported Water Availability

3-5.1 Groundwater

3-5.1.1 Main Basin Conditions

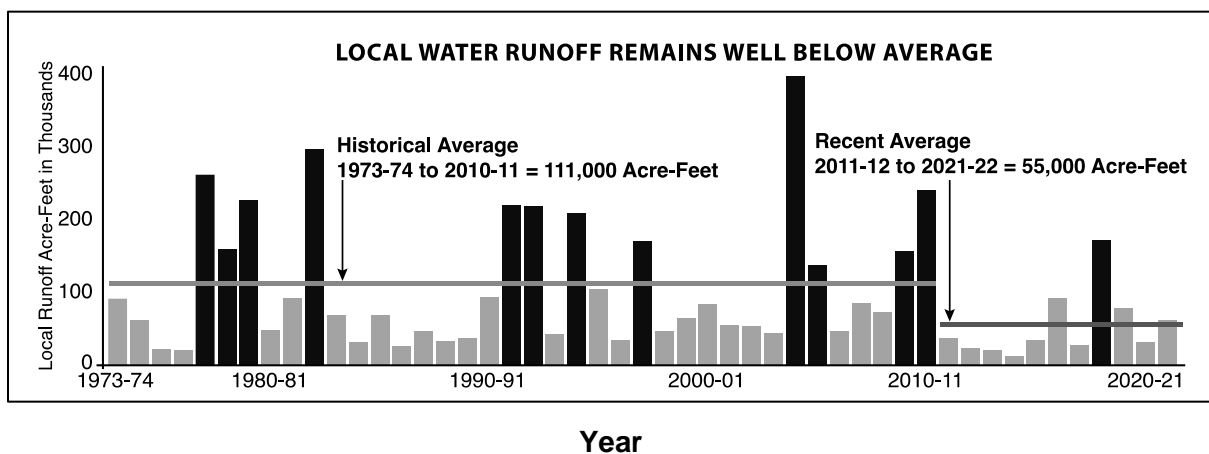
The Main Basin continues to be the region’s main water supply source for numerous retail agencies making up a majority of their supply source. Over the past several years, the Main Basin has experienced a reduction in groundwater levels due to decreased stormwater replenishment and longer lasting droughts and has not changed since the wet winter of 2022-2023. The Water Master estimates that local runoff used for groundwater replenishment has decreased over the last 10 years on average to about 55,000 acre-feet per year when compared to the historical 40-year average (years 1970 to 2010) of 111,000 acre-feet per year as illustrated on Figure 3-8.

This condition is further evidenced by the Key Well elevation being approximately 180 feet below mean sea level (see Figure 3-3). Even with the extensive conservation efforts put forth by retail agencies and resulting water demands trending downward since 2006 (see Figure 3-9), the Main Basin continues to struggle to maintain a Key Well elevation above 200 feet, which is the minimum goal of the Water Mater to allow higher OSYs.

As such, the Main Basin Water Master has taken proactive basin management actions in collaboration with Pumpers to address the replenishment shortfall and increase the overall health of the Main Basin as follows:

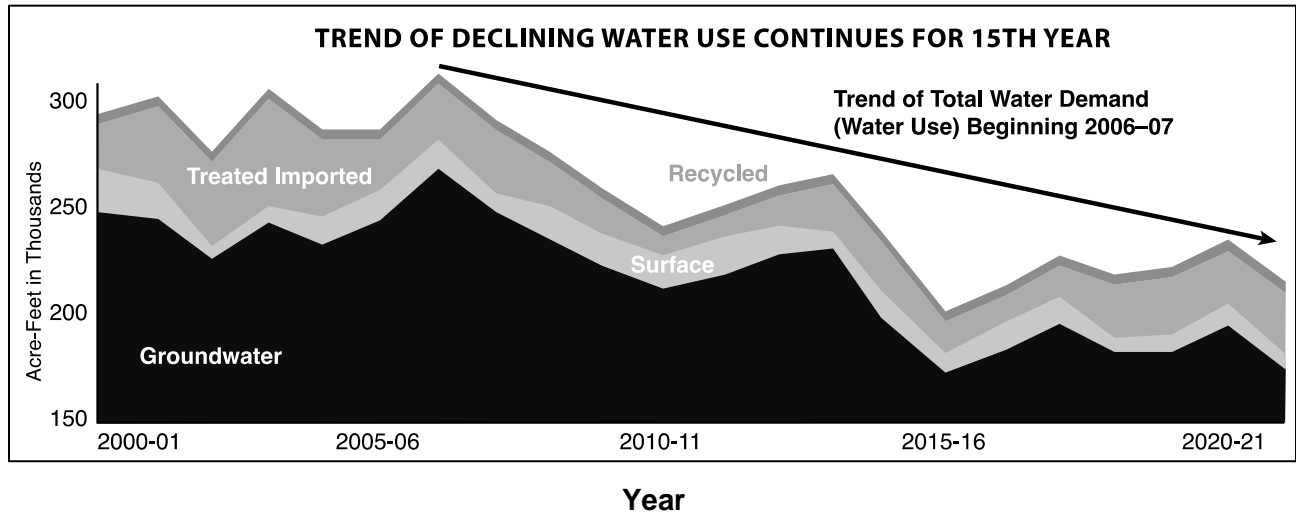
- Implemented Resource Development Assessment to purchase additional untreated imported water when available;
- Kept OSY low for eight consecutive years to increase replacement water demand;
- Increased cyclic storage with MWD for pre-delivery of 180,000 acre-feet over last 5 years;
- Encouraged Pumpers to purchase Cyclic Storage water to use for replacement water when over-pumping occurs; and
- Participated in the development of the Pure Water Program to bring up approximately 60,000 to 80,000 acre-feet per year to the Main Basin

**Figure 3-8
Main Basin Historical Runoff**



Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

**Figure 3-9
Historical Water Demand Trends**



Reference: Main San Gabriel Watermaster 2021-2022 Annual Report (SGVM, 2022)

3-5.1.2 Cyclic Storage and Conjunctive Use Agreements

Cyclic Storage and Conjunctive Use Agreements allow the storage of untreated imported water in a groundwater basin to be used at a later time. The main difference between the two types of agreements is that the ownership of the water stored under a Conjunctive Use structure is by the imported water wholesaler (e.g., MWD) for use at such a time as they deem necessary and can be extracted and used for distribution, whereas, the water stored under a Cyclic Storage Agreement is pre-purchased by the Water Master or water wholesaler for storage in the Main Basin with deliveries taken over a varying time period for long-term use to stay within the storage basin. The Water Master has implemented both types of storage programs within the Main Basin to support increased groundwater elevations and to assist Pumpers in offsetting cost for Replacement Water.

In 2017, the Water Master entered into a Cyclic Storage agreement with MWD and Upper District for the delivery approximately 60,000 to 80,000 acre-feet with payment to occur over the succeeding five year period. In 2019, the Water Master, along with area water wholesalers, extended the 2017 agreement for an additional 110,000 acre-feet of untreated imported water for storage into the Main Basin. This cyclic storage water has been used by the Water Master for replacement water, resource development water, and overall basin replenishment. The Water Master is being proactive in procuring imported untreated replenishment water when it becomes available.

In 2023, MWD via SGVMWD is looking to enter into a Cyclic Storage agreement with the Water Master and SGVMWD. This is a potential option for the City to maximize groundwater production to offset the cost for over-pumping of their adjudicated groundwater rights in various years. It is recommended that the City investigate cyclic storage quantity to allow for over-pumping of their adjudicated groundwater rights for a minimum of a 3-year period to help offset MWD rate increases that will be imposed on water wholesalers and retailers over the next several years and provide 100% local reliability.

3-6 Potential for Recharge Using Recycled Water and Stormwater Capture

The City does not currently have a recycled water program. The City has the potential to participate in recycled water development in multiple ways as follows:

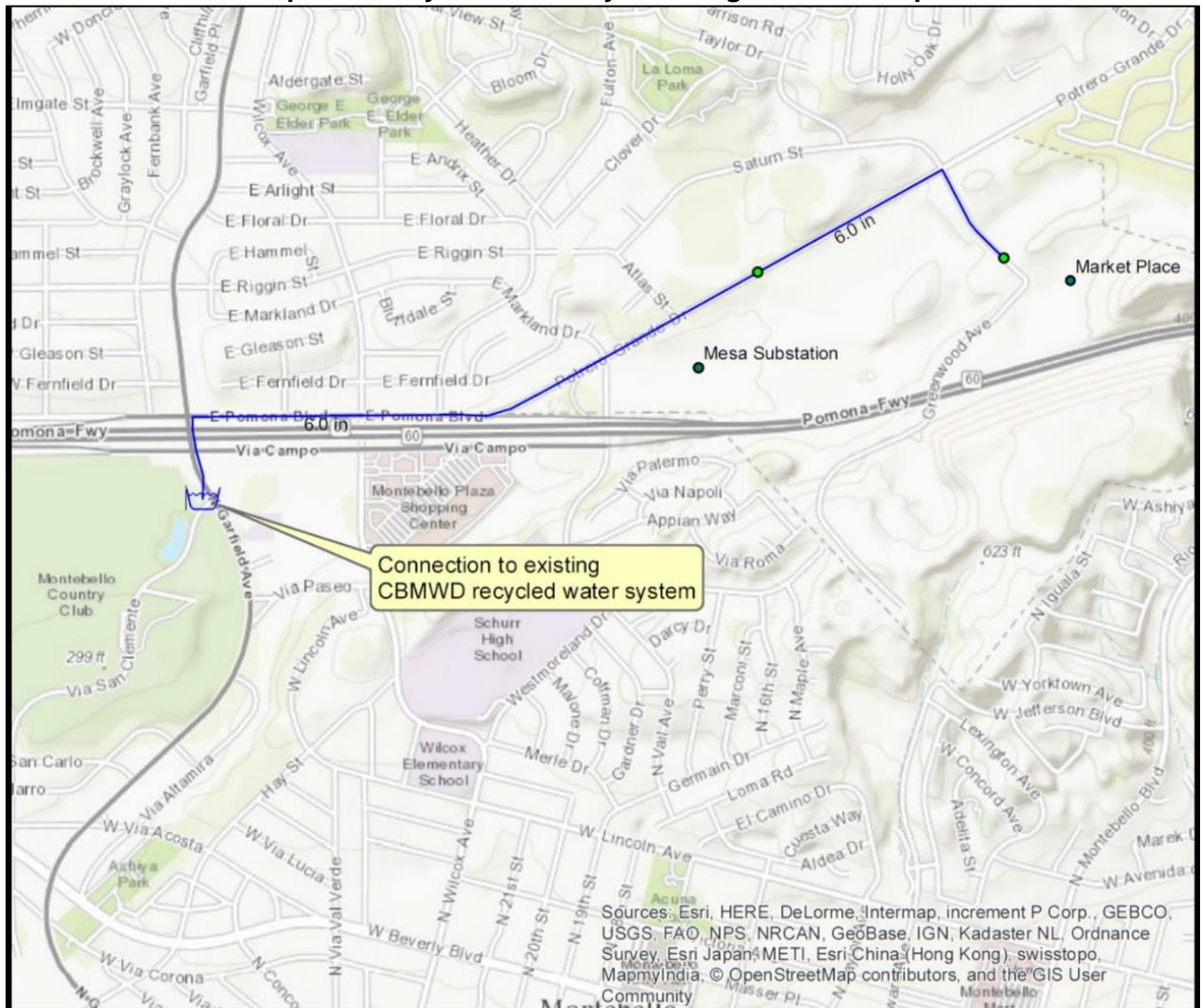
3-6.1 Recycled Water

3-6.1.1 Direct Water Recycling

In 2017, SGVMWD completed a San Gabriel Valley Regional Recycled Water Supply Program Feasibility Study (RWFS) (Robinson, 2023) for a recycled water system within the City of Monterey Park. The planned recycled water distribution system would be supplied from the Central Basin Municipal Water District (CBMWD) pipeline at the intersection of Garfield Avenue and Via San Clemente, in the City of Montebello. The RWFS recommended splitting the system into three phases, which are depicted in Figure 3-10 through Figure 3-13.

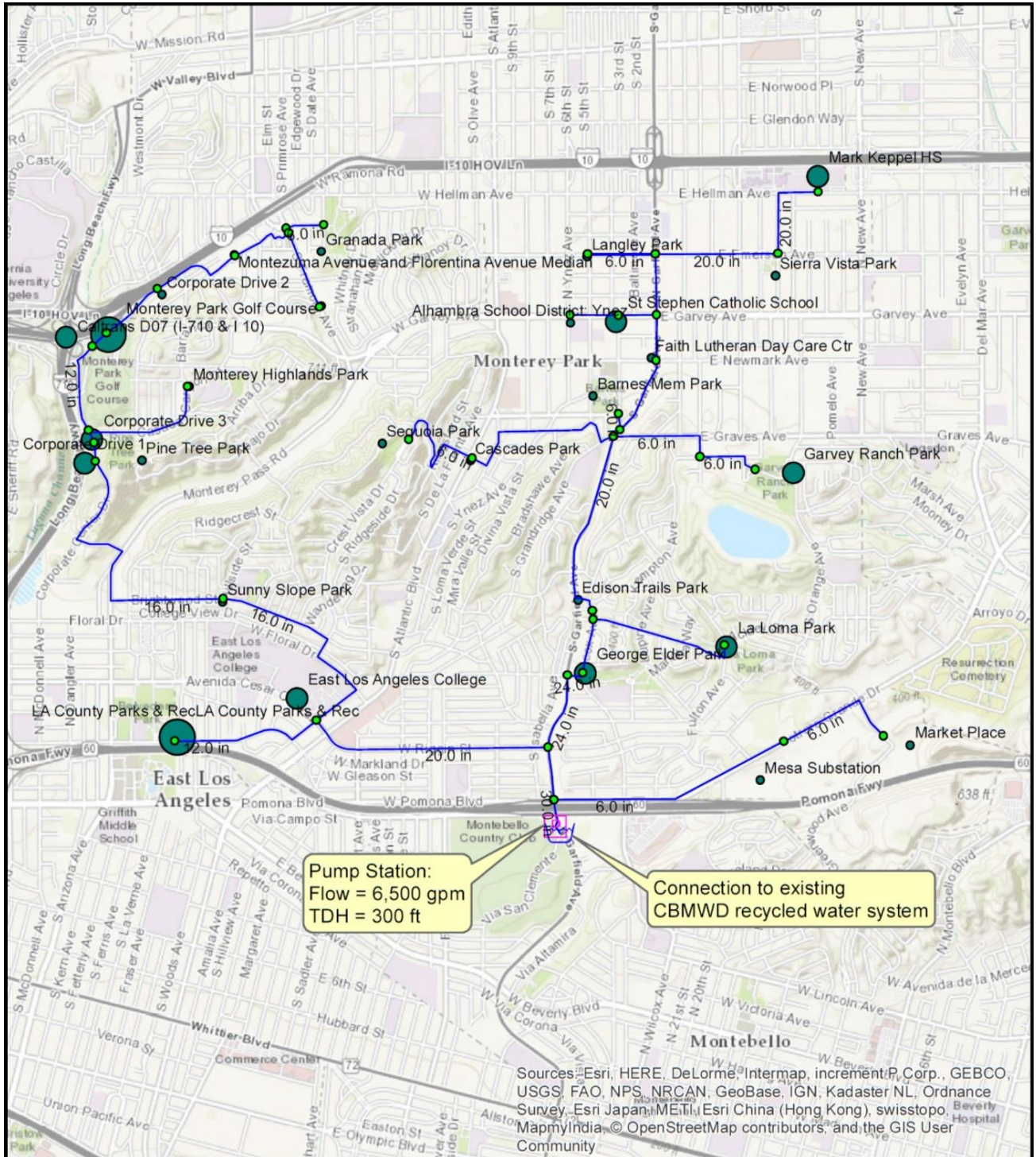
Figure 3-10

Phase 1 Proposed Recycled Water System Alignment and Pipeline Sizes



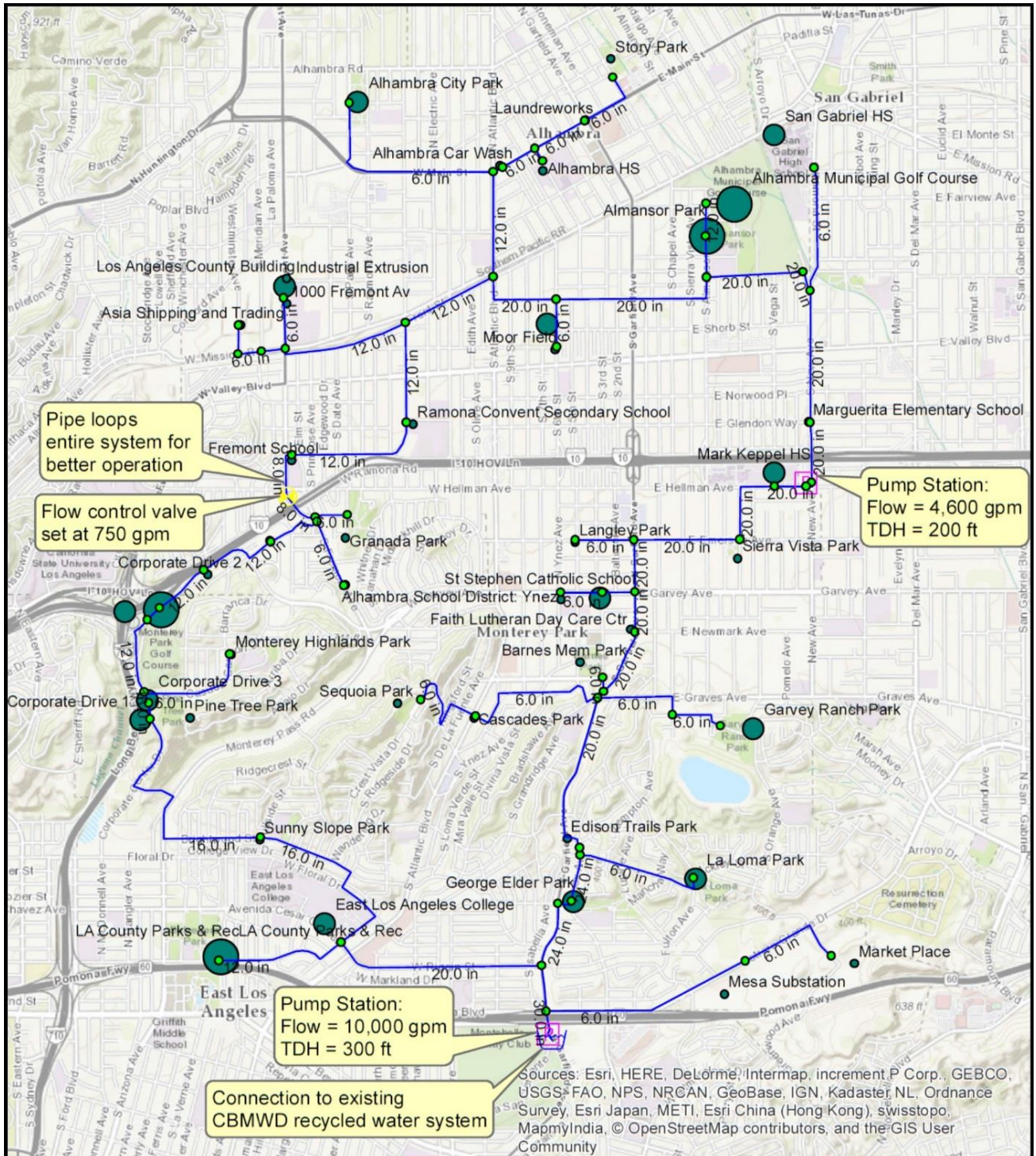
Reference: San Gabriel Valley MWD Final Recycled Water Feasibility Study (SGVMWD, 2017)

Figure 3-11
Phase 2 Proposed Recycled Water System Alignment and Pipeline Sizes



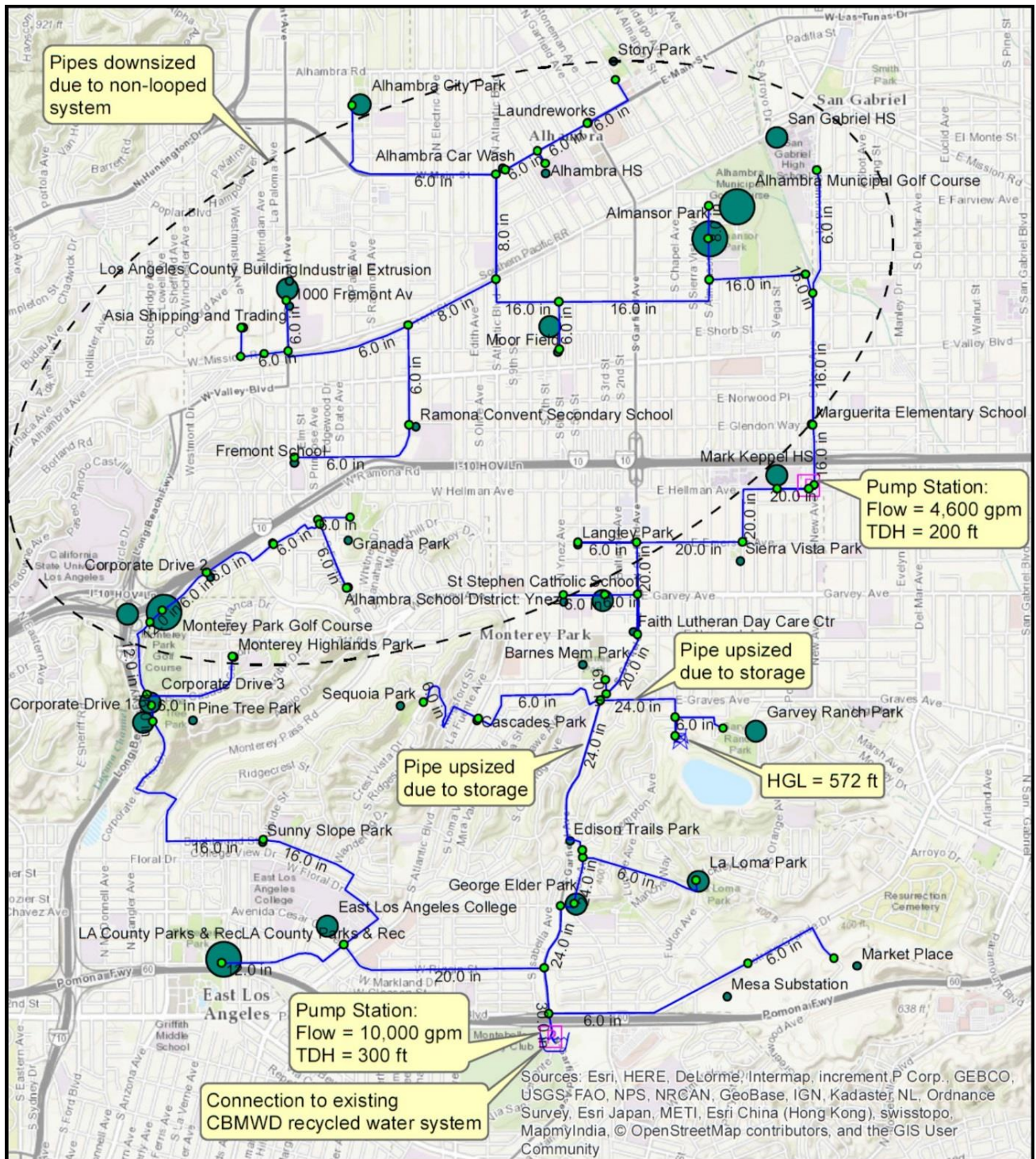
Reference: San Gabriel Valley MWD Final Recycled Water Feasibility Study (SGVMWD, 2017)

Figure 3-12
Phase 3 Proposed Recycled Water System Alignment and Pipeline Sizes - Looped System



Reference: San Gabriel Valley MWD Final Recycled Water Feasibility Study (SGVMWD, 2017)

Figure 3-13
Phase 3 Proposed Recycled Water System Alignment and Pipeline Sizes –
Non-Looped System



Reference: San Gabriel Valley MWD Final Recycled Water Feasibility Study (SGVMWD, 2017)

3-6.1.2 Regional Recycled Water Recharge

In addition to the historical actions the City has taken in conjunction with groundwater management agencies, the City may be involved in a regional program to deliver recycled water to the San Gabriel Valley to replenish the Main San Gabriel Basin. MWD is developing its Pure Water SoCal Project. MWD is partnering with the Los Angeles County Sanitation District (LACSD) to investigate the viability of providing up to a total of 150 million gallons per day (MGD) (approximately 168,000 AFY) of advanced treated wastewater from LACSD's Joint Water Pollution Control Plant located in Carson, California (Carson Plant). Of the 168,000 AFY, approximately 60,000 to 80,000 AFY is planned for the Main Basin. The Pure Water SoCal Project would deliver purified water from the Carson Plant through up to 60 miles of transmission pipelines to groundwater basins within MWD's service area, including the Main Basin. The purified water would be used in various locations within MWD's service area for groundwater recharge, groundwater storage, and industrial facilities. In addition, purified water could potentially be treated further at two of MWD's existing water treatment plants for direct potable reuse. The locations of the proposed pipeline alignments are provided on Figure 3-14.

The Pure Water SoCal Project's plant, associated pipelines and ancillary facilities would take approximately 11 years to construct at an estimated cost of over \$3 billion. The project's environmental document is currently in progress and the anticipated start of construction is 2028-2030.

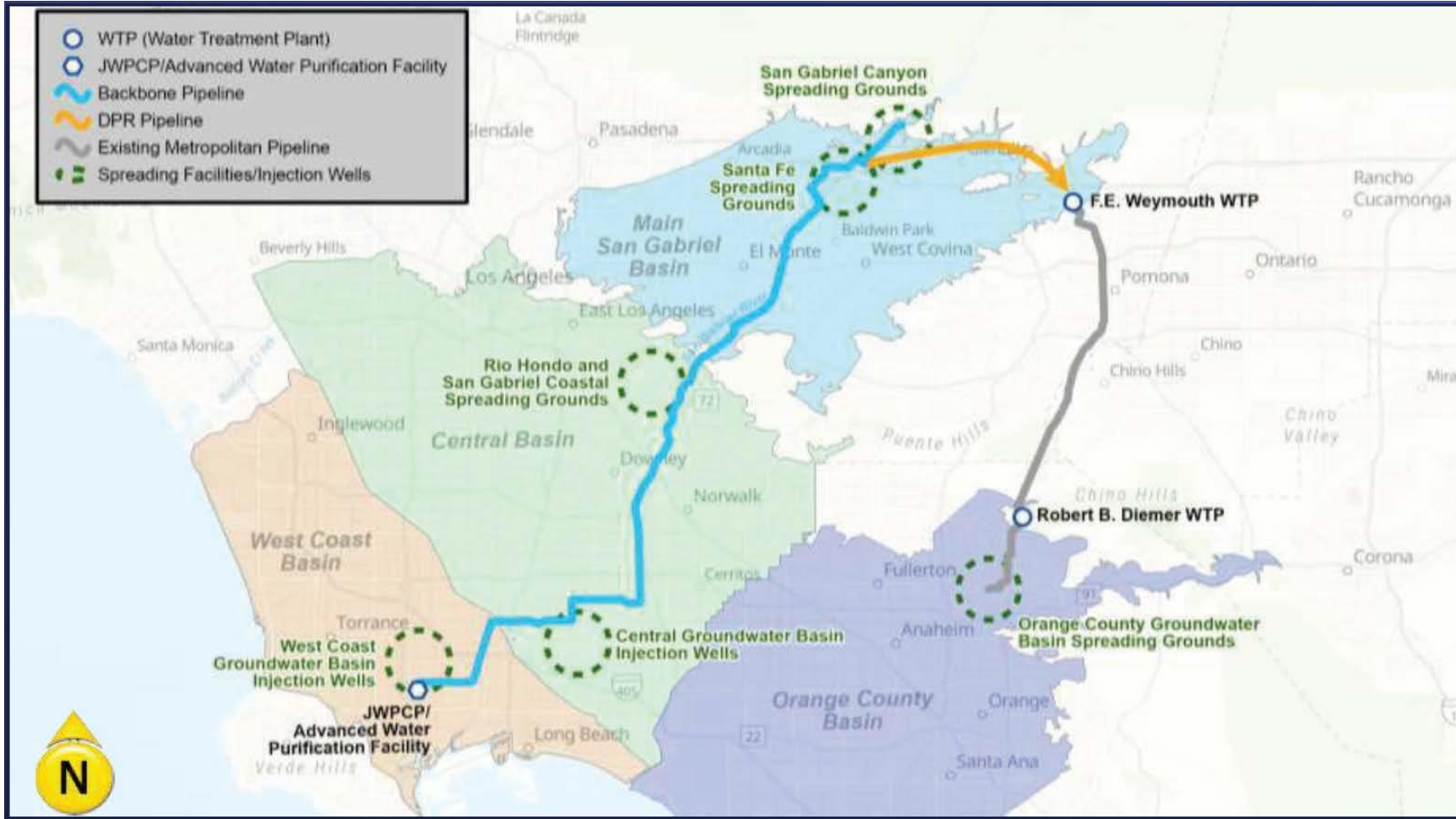
Pursuant to MWD's "Regional Recycled Water Program Conceptual Planning Studies Report", February 2019, the proposed RRWP would potentially provide 60,000 to 80,000 AFY to replenish the Main Basin. A portion of the replenished recycled water may be designated as Replacement Water (see Section 6.2.2 of the 2020 UWMP) and will offset all State Water Project water (on an AF for AF basis) which historically has been used to replenish the Main Basin groundwater supplies and is essential to sound Main Basin management. Furthermore, some of the replenished recycled water may be used for general Main Basin benefit which will result in higher groundwater levels and potentially enable the Operating Safe Yield to be established at a higher amount than had no deliveries occurred. For the Main Basin, MWD has thus far entered into a letter of intent with San Gabriel Valley Municipal Water District as well as Upper San Gabriel Valley Municipal Water District for at least 35,000 AFY and Three Valleys Municipal Water District for at least 6,500 AFY and will potentially provide up to 60,000 to 80,000 collectively.

3-6.2 Stormwater

Water supply availability continues to heighten the awareness and use of existing water supplies and the focus on developing new source water alternatives. Stormwater capture projects are being considered by agencies at a local level and regional basis as an additional water supply alternative. Stormwater capture projects use local stormwater discharges that would normally be discharged to a river or ocean via city or county-maintained storm drain systems and instead use this water for groundwater replenishment in local groundwater basins, irrigation water at municipal/commercial sites, and other similar uses.

Various agencies have ventured into the stormwater capture arena with the development of local and regional projects. The Southern California Water Coalition (SCWC) published a 2018 whitepaper that assessed stormwater capture projects of varying magnitude across the Southern California region. The goal of the SCWC whitepaper (Whitepaper) was to identify stormwater capture volumes, costs, benefits, and project performance across the region to better make future project decisions.

Figure 3-14
 Proposed MWD Pure Water Southern California Project Facilities



Reference: Metropolitan Water District website for Pure Water Southern California:
<https://www.mwdh2o.com/building-local-supplies/pure-water-southern-ca> (MWD, 2023)

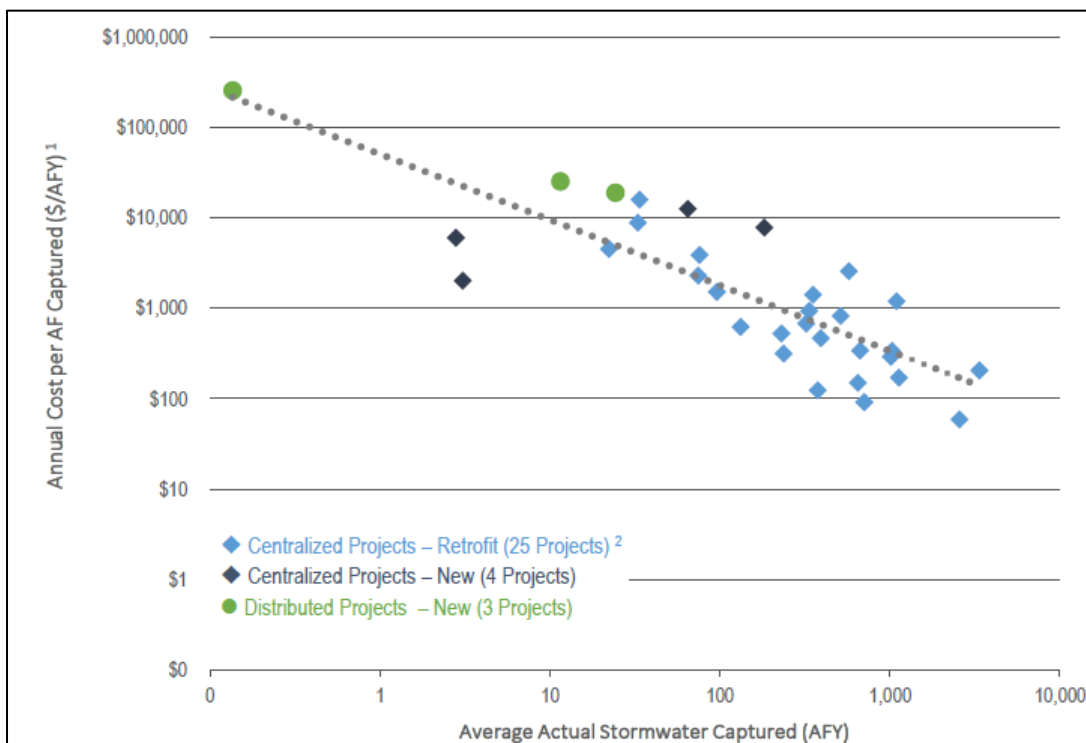
The Whitepaper assessed 32 of the 54 identified stormwater capture projects of varying sizes from six (6) agencies.

The Whitepaper categorizes stormwater projects into three main definitions as follows:

- **Centralized for Recharge:** Projects which capture rainfall and stormwater runoff from natural and engineered drainage systems and stored in centralized facilities such as spreading basins and recharge basins for the managed replenishment of local groundwater basins.
- **Distributed for Recharge:** Projects which retain rainfall and stormwater runoff on site (at end user locations) to infiltrate into and replenish local groundwater basins. Examples of distributed recharge projects include green streets, park retrofits, permeable pavement and bio-swales.
- **Distributed for Direct Use:** Projects which capture and store rainfall and stormwater runoff on site (at end user locations) which is then used to meet non-potable demands. Examples include stormwater capture using rain grading, tanks and cisterns, permeable pavement, and parkway basins. In some instances, stormwater capture for direct use may be used to meet potable demands as well.

The Whitepaper analysis determined that the cost and size of stormwater capture projects were core attributes in developing cost impactful projects. The cost of constructing and operating stormwater projects versus the stormwater yield captured is shown on Figure 3-15.

**Figure 3-15
SCWP Unit Cost by Amount of Stormwater Captured**



Reference: Los Angeles County Department of Public Works website: <https://safecleanwaterla.org> (LACDPW, 2023)

There are tremendous financial and institutional benefits to the larger Centralized for Recharge types of projects that produce an overall lower cost water supply. The overall findings of the Whitepaper analysis are as follows:

- Capital costs totaled \$132 million for the 32 projects
- Costs of the projects range from \$59 per acre-foot to more than \$250,000 per acre-foot. Project cost range includes capital costs as well as operation and maintenance costs.
- Median costs for distributed projects are \$25,000 per acre-foot and new centralized projects are \$6,900 per acre-foot. Project cost range includes capital costs as well as operation and maintenance costs.
- The average stormwater captured for all 32 projects during the 11-year period was 13,400 AFY

The whitepaper analysis supports the findings of several local stormwater capture projects that have been completed or in process by local Los Angeles County municipalities.

In 2018, Los Angeles County voters passed Measure W to fund the Safe Clean Water Program (SCWP). The SCWP's purpose is to provide regional direction to capturing stormwater to reduce reliance on imported water, provide enhanced water quality in stormwater discharges, and improve flood control management. The SCWP management is divided into nine watershed area steering committees that drive direction over regional projects. The City is part of the Upper San Gabriel Valley River Region. The SCWP is funded by a private parcel tax for properties within the Los Angeles County Flood Control District (LACFCD) service area. Fifty percent of funds are distributed proportionally to tax revenues collected for regional projects within that watershed region and forty percent are distributed directly to local municipalities proportional to tax revenues collected within their boundary. Each year participants of the SCWP file an annual report detailing the proposed projects they plan to implement.

In consideration of the most cost-effective type of groundwater recharge project with maximum benefits to the City, the Pure Water Southern California Program will provide the greatest value to the City's long-term water supply portfolio. Furthermore, this program is being developed at a rapid pace considering the size and span of the program, environmental processes, and stakeholders. It is recommended that the City support the Water Master's efforts in developing this project to fruition.

3-7 Water Banking

Water Banking has become an additional water portfolio management tool for many western US states to address declining water supplies and increased costs of imported water. Water banking allows for the storage of surplus surface water in a groundwater basin for use at a later time. In concept water banking appears to be a practical approach to enhancing and diversifying a water agency's water supply portfolio. However, due to the Southern California geography, complicated water rights issues, groundwater basin management requirements, and the ability to physically take delivery of banked water, there are numerous complex and costly hurdles to overcome to be involved in water banking.

Water banking opportunities for Southern California occur mostly in the Kern County area at the southern tip of the central valley near Bakersfield California in the San Joaquin Valley Groundwater Basin (SJV Basin). It is estimated that the SJV Basin can store up to 10 million acre-feet with approximately 1.5 million acre-feet available to the Kern Water Bank.

Various agencies have formed water banking projects within the SJV Basin. The largest being the Kern Water Bank. The Kern Water Bank (KWB) consists of six core agencies operating under a Joint Powers Authority to store water from the Central Valley Project (CVP) and SWP. The water is primarily used to serve local agricultural and residential demands. However, several large California water agencies have also contracted with various members of the KWB to bank water for later recovery and use during dry years.

For example, the Semitropic Water Storage District (SWSD), a KWB JPA member, stores up to one million acre-feet for several water agencies such as MWD. Being the largest storage partner, MWD has storage rights within the SJV Basin up to 350,000 acre-feet compared to the San Diego County Water Authority (SDCWA) which has storage rights up to 30,000 acre-feet. SWSD indicates that they are expanding their water banking capacity and are seeking additional partners.

Other Southern California water agencies have developed their own water banking storage facilities within the SJV Basin through land purchases, construction of spreading basins, and groundwater recovery facilities. SWP and CVP water is purchased from water right holders for water banking during available wet years. Taking physical delivery of the banked water remains one of the most challenging hurdles to water banking.

Most Southern California agencies involved in water banking take delivery of the physical water through exchanges with MWD or a SWP Contractor. The other option is to wheel the physical water through the MWD transmission infrastructure and take physical delivery of the actual water. There are numerous MWD requirements in addition to wheeling costs involved in transferring physical banked water through MWD’s transmission system. The wheeling costs per MWD are based on a negotiated amount and at the discretion of the General Manager to determine if sufficient capacity exists within the MWD transmission system to wheel water during the desired time frame. Wheeling costs are also potentially subject to MWD Capacity and Readiness-to-Serve (RTS) charges.

Water banking can be a proactive way to ensure water supply reliability to the City. However, there is no guarantee that the banked water can be delivered in the time frame it is needed or at a reasonable cost. Water banking is a more robust long-term water supply portfolio management tool than a short-term tool. For example, in December 2021, MWD agreed to purchase 4,200 acre-feet of SDCWA banked water in the SWSD system for \$983 per acre-feet. SDCWA purchased the banked water in 2008 for approximately \$285 per acre-feet.

Water banking is not recommended as a short-term viable approach for the City given the numerous challenges associated with taking delivery of the banked water and the high costs. More immediate and local water supply reliability approaches are available (e.g., Pure Water SoCal Program groundwater recharge, cyclic storage purchases, etc.) to balancing the City’s long-term water supply portfolio than water banking. Should the City desire to proceed with water banking supply enhancements, it is recommended that a qualified consultant be engaged that is knowledgeable in water banking specifics to guide the City through the process of establishing a storage water bank.

3-8 Water Conservation and Rationing
3-8.1 Water Conservation

Water conservation has been at the forefront as an alternative water supply for several decades, helping communities meet increasing water demands while populations grow and businesses develop. The City, like many agencies across the country, has partnered with customers and

regulatory agencies to find innovative ways to reduce water use while ensuring sufficient supplies and minimizing increasing costs.

In 1996, the City started its compliance roadmap of the State of California’s SB X7-7 law to achieve a reduction of 20% of its demands by 2020 or to achieve 95% of the applicable state hydrologic region target as set forth in the State’s 20x2020 Water Conservation Plan. To achieve 95% of the South Coast Hydrologic Region target, the City’s 2020 target was established as shown in Table 3-4.

**Table 3-4
SBX7-7 Target and Performance**

2020 Target (GPCD)	2020 Actual (GPCD)
218	194

The City has not only achieved their 2015 interim SB X7-7 target goals; they have also achieved their 2020 ultimate target goals. The City’s extensive conservation efforts have been a core part in obtaining this performance.

The City’s exceptional water conservation performance achievements have been a result of its offering of a wide array of conservation programs. The residential conservation programs have included low flow fixture replacements, low-flow toilet retrofits, turf replacement, smart irrigation controller replacements, high efficiency clothes washer replacements, and rain barrel/cistern programs. Additionally, the City has instituted conservation rates that encourage customers to use less water based on a two-tiered volumetric system.

The commercial conservation programs have included low-flow toilet retrofits, commercial turf replacement, and replacement of traditional urinals with waterless urinals. The aforementioned programs have been essential in achieving each of the City’s SB X7-7 target compliance.

Like all new water supply development, these conservation efforts have come with a significant capital investment. Unlike traditional water supply projects that construct and operate tangible assets (e.g., treatment plants, wells, pipelines, reservoirs, etc.), water conservation typically has minimal to no tangible conventional assets, and as such, can be difficult to quantify its costs and impacts. A 2015 Pacific Institute study titled “The Cost of Alternative Water Supply and Efficiency Options in California” examined several years of conversation program costs across California and translate them into dollars per acre-feet savings. The following are costs associated with Residential Water Efficiency Measures:

Several of the traditional water conservation measures have been implemented include water efficient washing machines, high-efficient toilets, commercial waterless urinals, rain barrels, irrigation controllers, soil moisture systems, rotating sprinkler nozzles, flow monitoring devices that provide date of use and irrigation control retrofit programs.

Water conservation has made significant contributions to increasing water supply for a growing population. However, there are continuing challenges associated with water conservation efforts as follows:

- A. Market Penetration:** Water conservation efforts have been ongoing for several decades. While water conservation has had significant impacts in freeing up additional water supply for growth, much of the traditional water conservation efforts have been implemented across the City as a result of excellent outreach and regulatory changes in the plumbing codes. As such, it is increasingly more difficult to achieve that next level of water conservation savings without tremendous impacts to costs and customers’ standards of living.

- B. Wastewater Impacts:** While there have been extensive efforts put into water conservation efforts on the potable water use arena, there has been minimal effort put into the impacts water conservation has had on wastewater management. While water conservation has achieved significant water savings, this has resulted in increased operational challenges in wastewater treatment, conveyance costs and recycled water costs. Older wastewater treatment and conveyance systems were designed for a minimum of 100 to 125 gallons per capita per day (gpcd). When compared to the proposed State of California indoor wastewater discharge goals of 52.5 gpcd by 2025 and 50 gpcd by 2030, this presents operational challenges in additional treatment costs (e.g., more energy, chemicals, and labor). In some instances, entire infrastructure has had to be replaced to accommodate lower wastewater flows. Much of the older sewer infrastructure was originally designed for 2 feet per second velocities and now must be designed for 3 to 4 feet per second to achieve the same cleansing velocity with lower sewer flows, thus, requiring more lift stations and associated pumping and energy costs.
- C. Cost:** The development of additional water supplies is traditionally more costly than existing sources. Similarly, the same is true for water conservation efforts. The City has achieved remarkable success in implementing water conservation technology. However, the next level of water conservation will require innovation and will be more costly than the traditional water conservation efforts recognized to date as the existing market reaches maturity and full market penetration with traditional devices. In addition, continued water conservation measures will result in reduced water sales, which in turn will reduce revenue. This reduction of sales and revenue may result in the need to increase water rates to pay for fixed water infrastructure operating costs.

Water conservation continues to play a core part of the City's water supply portfolio. Moving forward, water conservation programs will continue to be offered. However, as these traditional water conservation efforts are reaching implementation maturity, there will be less additional water savings recognized from this part of the water supply portfolio. Additionally, increased water conservation results in an impact to future recycled water production.

3-8.2 Water Rationing

On September 1, 2022, the City implemented Stage 3 of its Water Shortage Contingency Plan (WSCP). The primary objective of Stage 2 is to reduce water use by 20 percent. Monterey Park's average use is 112 gpcd. Therefore, Stage 2 requires each resident to reduce water usage by about 22 gpcd to comply.

The WSCP Stage 2 mandatory restrictions include the following:

1. Watering outdoors for the purposes of irrigating landscape, lawns, vegetated areas, and plant material without the use of a drip irrigation or micro-spray system is limited to two (2) times per week. Residents may water and/or irrigate landscape lawns, vegetated areas, and plant material on Monday and Thursday.
2. Installing non drip irrigation or micro-spray systems used in watering outdoors for purposes of irrigating landscape, lawns, vegetated areas, and plant material in new commercial and residential developments requesting new water utility service is unlawful.
3. It is unlawful to use potable water to irrigate ornamental turf on public street medians within the City's service boundaries.

While MWD implemented a water shortage emergency in April 2022 for all SWP dependent member agencies, it has yet to enact its Water Supply Allocation Plan. SWP dependent member agencies have been mandated to restrict watering to one day per week.

Implementation of the WSCP and associated water rationing that were implemented in 2020 and 2021 could potentially be decreased to the lowest WSCP level as the State of California rescinded the 15-percent voluntary reduction in water use. This is supportive of the wet winter that occurred in 2022-2023. Increase in WSCP levels and mandatory restrictions could also be implemented should the drought conditional returned and available water supplies become more restricted.

3-9 Main Basin Water Rights Purchases

The City’s most cost-effective water supply is its groundwater pumping from the Main Basin. As discussed in Section 3-2, maximizing the City’s Main Basin groundwater pumping rights is critical to ensuring local water reliability. With a prescriptive right of 3.3920 percent, acquiring additional Main Basin groundwater rights would help ensure continued water reliability at a more cost-effective rate than using imported water supplies.

There are a total of 78 entities with pumping rights within the Main Basin. Sixty-eight (68) Pumpers have a total groundwater right of 76.46119 percent and 10 Integrated Pumpers have a total groundwater right of 23.53881 percent. The largest users (e.g., > 1%) of each category are shown in Table 3-5.

Sixteen (16) of the sixty-eight (68) Pumpers make up 67.22364 percent and eight (8) of the ten (10) Integrated Pumpers make up 23.45507 percent of the Main Basin groundwater pumping rights for a total of twenty-six (26) Pumpers holding 90.67871 percent of total Main Basin groundwater pumping rights. Thus, 9.32129 percent of groundwater pumping rights are held by fifty-two (52) smaller and mostly non-municipal entities. In the past, the City was successful in securing additional groundwater rights from Los Flores Mutual Water Company for a total addition of 26.60 acre-feet.

With an OSY of 130,000 acre-feet, there is approximately 12,107 acre-feet available from non-municipal Pumpers that could have an interest in selling or leasing these groundwater rights as they become available, or these entities decide they no

**Table 3-5
Largest Main Basin Groundwater Rights Users**

Main Basin Pumper	Percent Groundwater Right
Suburban Water Systems	12.59998
San Gabriel Valley Water Co.	10.49247
California Domestic	6.26154
Cal American-San Marino	4.74431
City of Alhambra	4.45876
City of Arcadia	4.23099
City of Whittier	4.18519
City of Monterey Park	3.39216
Pellissier Irrevocable QTIP Trust	3.28384
Valley County Water District	3.01517
Golden State Water_S.G.V. District	2.92105
San Gabriel County Water District	2.73019
City of El Monte	1.40888
IBY Property Owner, LLC	1.20047
Hanson Aggregates West, Inc.	1.17094
Sunny Slope Water Co.	1.12770
Subtotal	67.22364
Azusa Valley Water Co.	5.06299
City of Glendora	4.75261
Covina Irrigating Co.	3.22577
City of Monrovia	3.09472
County of Los Angeles	1.88292
City of Azusa	1.84988
Cal American (Duarte)	1.84634
Golden State Water Co. San Dimas District	1.73984
Subtotal	23.45507
Total	90.67871

longer have a need for them. A one percent acquisition of additional groundwater pumping rights would yield an additional 1,300 to 2,500 acre-feet per year with an OSY of 130,000 to 250,000 acre-feet OSY, respectively.

It is recommended that the City actively engage these smaller groundwater right entities to gauge their interest in selling or leasing their Main Basin rights as outlined in Table 3-5.

3-10 Recommendations

Water supply reliability is a critical component to the City's future water portfolio. Managing all the integrated parts of this portfolio will establish the most cost-effective approach to ensuring reliable service to the customers. The following are recommendations for the City to consider in implementing the City's future water supply portfolio combined with the other sections of this Master Plan.

3-10.1 Support Groundwater Projects that Increase Main Basin Operating Safe Yield

Support of projects that increase the Main Basin OSY will result in greater pumping rights availability to the City. Projects the City should consider include the MWD Pure Water Program that will provide significant recharge of the Main Basin of up to 80,000 acre-feet per year using purified recycled water. Other projects for consideration include local stormwater capture projects that result in recharge of the Main Basin in significant quantities.

3-10.2 Investigate Cyclic Storage to Offset Imported Water Cost

Investigate and potentially implement a City's cyclic storage account which will assist in offsetting increased imported water costs. It is recommended that the City purchase a minimum of 5-years of supplemental untreated imported water to store in their cyclic storage account to offset future MWD imported water rate increases. This approach will allow the City to over pump groundwater and replace it with cyclic storage water purchased in prior years, thus, minimizing the need to take more expensive imported water that experiences a rate increase of approximately 5% per year on average. It is critical for the City to develop additional well pumping capacity to recognize the benefits of cyclic storage and full groundwater pumping rights during high demand seasons.

3-10.3 Continue to Implement Water Conservation Measures to Reduce Water Demands

It is recommended the City continue to work with its residents to ensure mandatory conservation restrictions are implemented and conservation rebates are readily available.

3-10.4 Pursue the Purchase of Additional Main Basin Groundwater Rights

It is recommended that the City reach out to the non-municipal Main Basin Groundwater right holders to gauge their interest in selling their groundwater rights. A one percent increase in groundwater rates will result in an additional 1,300 AFY to 2,500 AFY. This effort could result in a significant cost savings to the City each year in regards to the water budget.

3-10.5 Actively Participate in Main Basin Water Policy Decisions

The City's active involvement in regional policy decisions will help minimize future water increases. The Water Master determines each year how much replenishment water will be purchased and spread and the associated assessment costs. The City's input into this process will allow collaboration on future rate increases, setting of OSY levels, and assessment policies that result in costs to Basin Pumpers.

3-10.6 Develop an Indirect Recycled Water Project

The City should coordinate with SGVMWD to obtain U.S. Bureau of Reclamation approval of the Recycled Water Feasibility Study (RWFS) so the next planning and design steps can be pursued.

SECTION 4
WATER USE

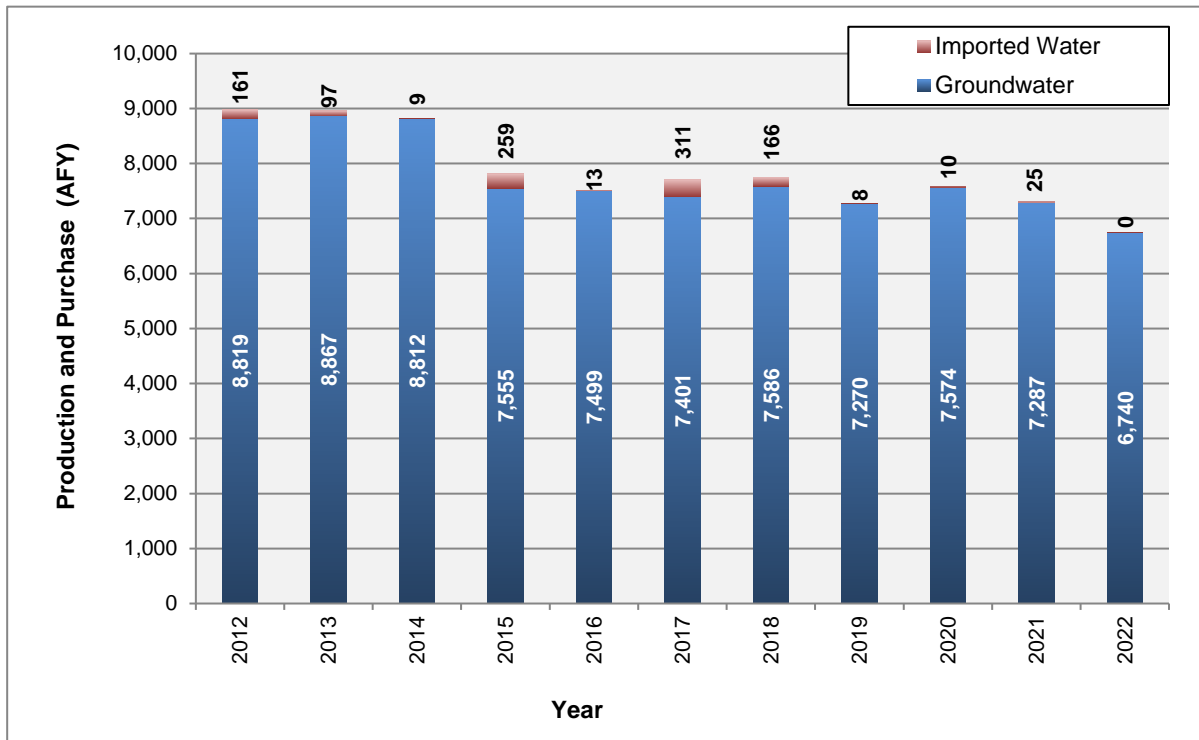
4-1 Historical Annual Water Use

The City obtains its potable water supply through groundwater wells in the Main San Gabriel Basin (Main Basin) and imported water from the San Gabriel Valley Municipal Water District (SGVMWD). The City currently owns twelve (12) wells in the Main Basin. Four (4) of these wells are currently inactive.

The total annual water production and purchase from 2012 to 2022 is shown in Table 4-1 and on Figure 4-1. Over the last ten years, the annual production and purchase total has averaged 7,861 AFY or 7.02 mgd. The average production from the Main San Gabriel Basin was 7,765 AFY or 6.93 mgd. The average amount of imported water purchased was 96 AFY or 0.086 mgd.

Since 2014, when the drought was declared in California, the total water production/purchase has decreased about 24 percent from about 8,821 AFY to 6,740 AFY. This may be due in part to the economic climate and a very conscientious water conservation effort by the City and the public.

Figure 4-1
Historic Annual Water Production and Purchase



**Table 4-1
Historic Annual Water Production and Purchase**

Calendar Year	Imported Water Purchased		Groundwater Production (AFY)														Total Production and Purchase (AFY)
	SGVMWD (AFY)	% of Total	Well 1	Well 3	Fern Well	Well 5	Well 6	Well 7	Well 8	Well 9	Well 10	Well 12	Well 14	Well 15	Total (AFY)	% of Total	
2012	161	2%	162	41	40	1,053	0	0	0	50	1,635	3,211	0	2,627	8,819	98%	8,980
2013	97	1%	97	0	271	1,005	0	0	0	6	1,429	3,165	0	2,894	8,867	99%	8,964
2014	9	0%	100	0	276	1,197	0	0	0	5	1,423	3,102	0	2,708	8,812	100%	8,821
2015	259	3%	86	0	221	954	0	0	0	790	1,218	2,747	0	1,539	7,555	97%	7,814
2016	13	0%	32	0	128	658	0	0	0	4	1,000	3,150	0	2,527	7,499	100%	7,512
2017	311	4%	111	0	315	275	0	0	0	5	941	3,101	0	2,652	7,401	96%	7,712
2018	166	2%	170	19	273	634	0	0	0	474	1,058	2,195	0	2,764	7,586	98%	7,752
2019	8	0%	54	120	60	345	0	0	0	750	630	2,149	0	3,163	7,270	100%	7,277
2020	10	0%	172	434	113	459	0	0	0	115	602	2,768	0	2,910	7,574	100%	7,584
2021	25	0%	182	446	210	774	0	0	0	4	1,116	2,490	0	2,064	7,287	100%	7,312
2022	0	0%	179	478	84	4	0	0	0	2	1,599	2,402	0	1,992	6,740	100%	6,740
Average	96	1%	122	140	181	669	0	0	0	201	1,150	2,771	0	2,531	7,765	99%	7,861

Well 6 is inactive

Well 7, 8, and 14 are on standby

4-2 Non-Revenue Water

As with most water providers, the City typically produces/purchases more water than the total quantity measured by the customer meters. The difference between production/purchase and water billing data is considered non-revenue water. The City calculates and reports non-revenue water to the Department of Water Resources each year. The non-revenue water ranged from 430 AFY in 2016 to 766 AFY in 2019 as shown in Table 4-2. The discrepancy is typically due to the differences in the accuracies of the few large meters which measure purchases and production, and the thousands of small customer meters which measure sales. Non-revenue water can also be due to unmeasured uses such as fire flows, water main flushing and other maintenance related tasks. The remainder may be due to leaks from the system.

The City’s annual non-revenue water has been increasing over the last five years. Since 2016, the non-revenue water percentage has been within industry standard (10 percent or less). It is assumed that as the City completes more and more replacement of pipe, this will reduce the number of water line breaks each year and possible undetected leaks, which in turn will reduce the non-revenue water volume.

**Table 4-2
Non-Revenue Water**

Fiscal Year	Non-Revenue Water	
	AFY	%
2016	430.2	5.7
2017	624.5	8.0
2018	726.5	9.2
2019	766.0	10.4
2020	543.5	7.1
Average	618.1	8.1

4-3 Water Demand Variations

Demand variations through a year are influenced by seasonal effects such as temperature, humidity, and precipitation. Due to its proximity to the Pacific Ocean, such variations are quite moderate for the City.

System demand variations throughout a day are influenced by the customer base and the daily lifestyles of the customers. In a service area such as the City’s, the peak demands within a day typically occur in the morning hours between 6:00 am and 9:00 am, when customers wake to begin their daily routine and significant landscape irrigation takes place. For this study, the variations are expressed as a ratio to the average demand, with the average demand being equal to one.

4-3.1 Monthly Demand Variations

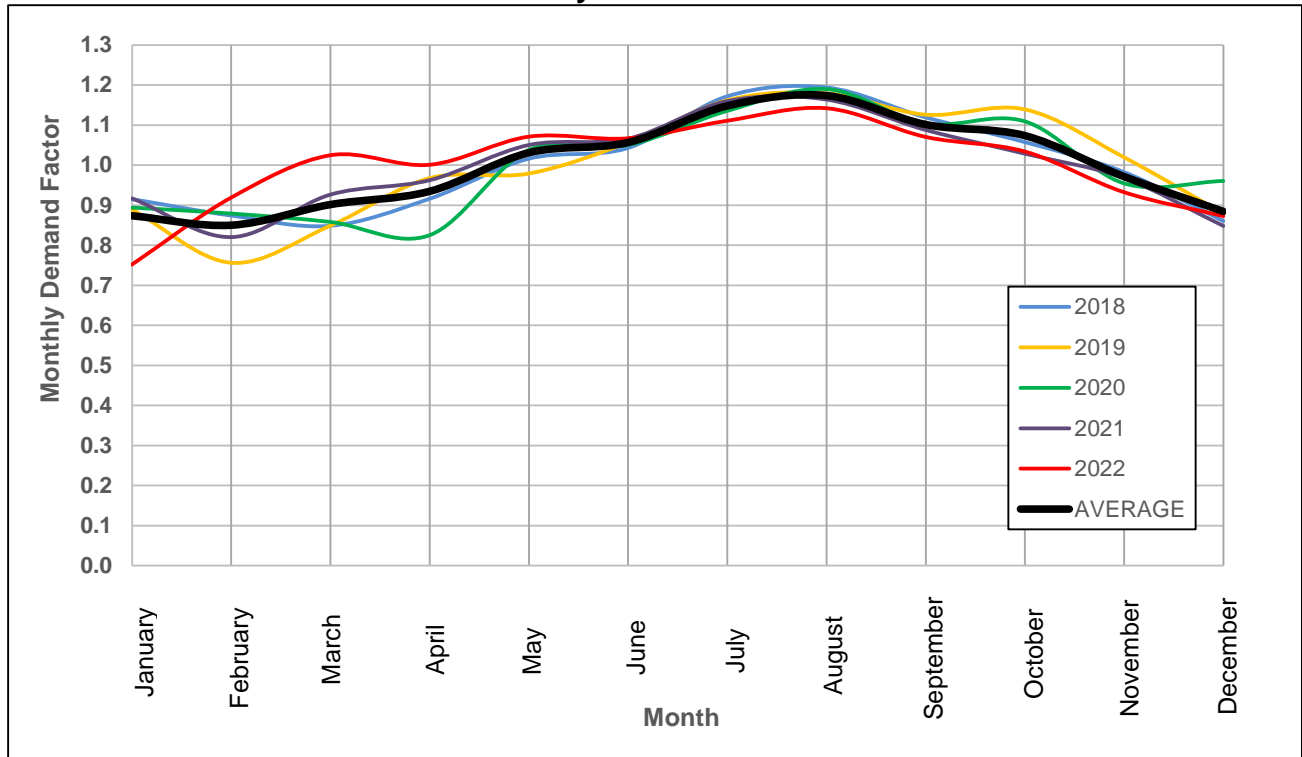
Typical of most Southern California communities, the City’s water consumption exhibits a distinct seasonal pattern. Peak and low monthly consumption occur during the dry summer months and wet winter months, respectively. Historic monthly production data was used to analyze monthly demand variations. The monthly demand factors are shown in Table 4-3. The highest water use typically occurs in July or August. The lowest water use typically occurs in December through March. The highest and lowest monthly demand factors were found to be 1.82 and 0.44, respectively. A graph of the historic monthly demand factors (monthly demand/average monthly demand) is illustrated on Figure 4-2. Monthly demand totals for 2018 through 2022 are shown in Table 4-3. Peak demands typically occur in August. Low demands typically occur in February. The highest and lowest monthly demand factors seen in Table 4-3 are 1.19 and 0.75, respectively. A graph of the monthly demand factors (monthly demand/average monthly demand) by water year is illustrated on Figure 4-2.

**Table 4-3
Monthly Water Production and Demand Factors**

Month	2018 (AF)	Monthly Demand Factor	2019 (AF)	Monthly Demand Factor	2020 (AF)	Monthly Demand Factor	2021 (AF)	Monthly Demand Factor	2022 (AF)	Monthly Demand Factor	Minimum Monthly Factor	Average Monthly Factor	Maximum Monthly Factor
January	591	0.92	539	0.89	565	0.89	559	0.92	422	0.75	0.75	0.87	0.92
February	565	0.87	459	0.76	556	0.88	500	0.82	516	0.92	0.76	0.85	0.92
March	548	0.85	515	0.85	543	0.86	565	0.93	576	1.02	0.85	0.90	1.02
April	592	0.92	587	0.97	522	0.83	587	0.96	562	1.00	0.83	0.93	1.00
May	657	1.02	594	0.98	656	1.04	640	1.05	602	1.07	0.98	1.03	1.07
June	674	1.04	640	1.06	664	1.05	650	1.07	599	1.07	1.04	1.06	1.07
July	757	1.17	704	1.16	718	1.14	707	1.16	624	1.11	1.11	1.15	1.17
August	771	1.19	715	1.18	752	1.19	709	1.16	642	1.14	1.14	1.17	1.19
September	723	1.12	683	1.13	698	1.10	663	1.09	601	1.07	1.07	1.10	1.13
October	683	1.06	691	1.14	701	1.11	627	1.03	581	1.03	1.03	1.07	1.14
November	635	0.98	618	1.02	603	0.95	590	0.97	524	0.93	0.93	0.97	1.02
December	556	0.86	533	0.88	607	0.96	517	0.85	490	0.87	0.85	0.88	0.96
Average	646	1.00	606	1.00	632	1.00	609	1.00	562	1.00	0.75	1.00	1.19

Note: Peak month factors are highlighted in red. Minimum month factors are highlighted in green.

**Figure 4-2
Monthly Demand Factors**



4-3.2 Daily Demand Variations

Within any given month, demand can vary based on usage patterns (i.e., weekend usage is typically different than weekdays) and other factors such as irrigation schedules. The maximum demand day occurring over the course of the year is an important parameter for planning purposes and the required source of supply is based on this demand. The maximum daily demand for 2018 through 2022 is shown in Table 4-4. The highest maximum day peaking factor is calculated as 1.45.

**Table 4-4
Water Consumption versus Water Production and Purchase**

Calendar Year	Total Production and Purchase or Historical Average Day Demand (AFY)	Historical Maximum Day Demand (AFY)	Annual MDD Peaking Factor
2018	7,752	11,226	1.45
2019	7,277	9,492	1.30
2020	7,584	10,405	1.37
2021	7,312	10,214	1.40
2022	6,740	8,910	1.32
Average	7,333	10,049	

¹ Maximum day demand based on historical daily production and purchase data, adjusted for discrepancies with time of meter and tank reading. A 2-day average was utilized to represent the maximum day

4-3.3 Hourly Demand Variations

Knowledge of accurate demand variations over a 24-hour period is essential for proper analysis of water systems. For this study, hourly demand variations were represented by the development of diurnal demand curves. The diurnal demand curves were employed in determining the adequacy of the sources of supply, pumping facilities, reservoirs, and the transmission/distribution facilities

The hourly water usage for various zones was determined based upon data collected from the City's SCADA system from July 16, 2022 to July 30, 2022. The facility flow meters, pump flows, and water levels in the reservoirs were utilized in calculating the demands and demand factors in 5-minute increments over a typical 24-hour period. The diurnal demand curves developed are shown on Figure 4-3. The peak daily factors range from 1.28 to 3.33 and typically occurs between 5 am and 8 am.

Due to limited available SCADA data, demand curves could not be developed for every zone. See Section 5, Existing System, for further descriptions on the hydraulic zones.

Diurnal demand curves were developed for the following zones:

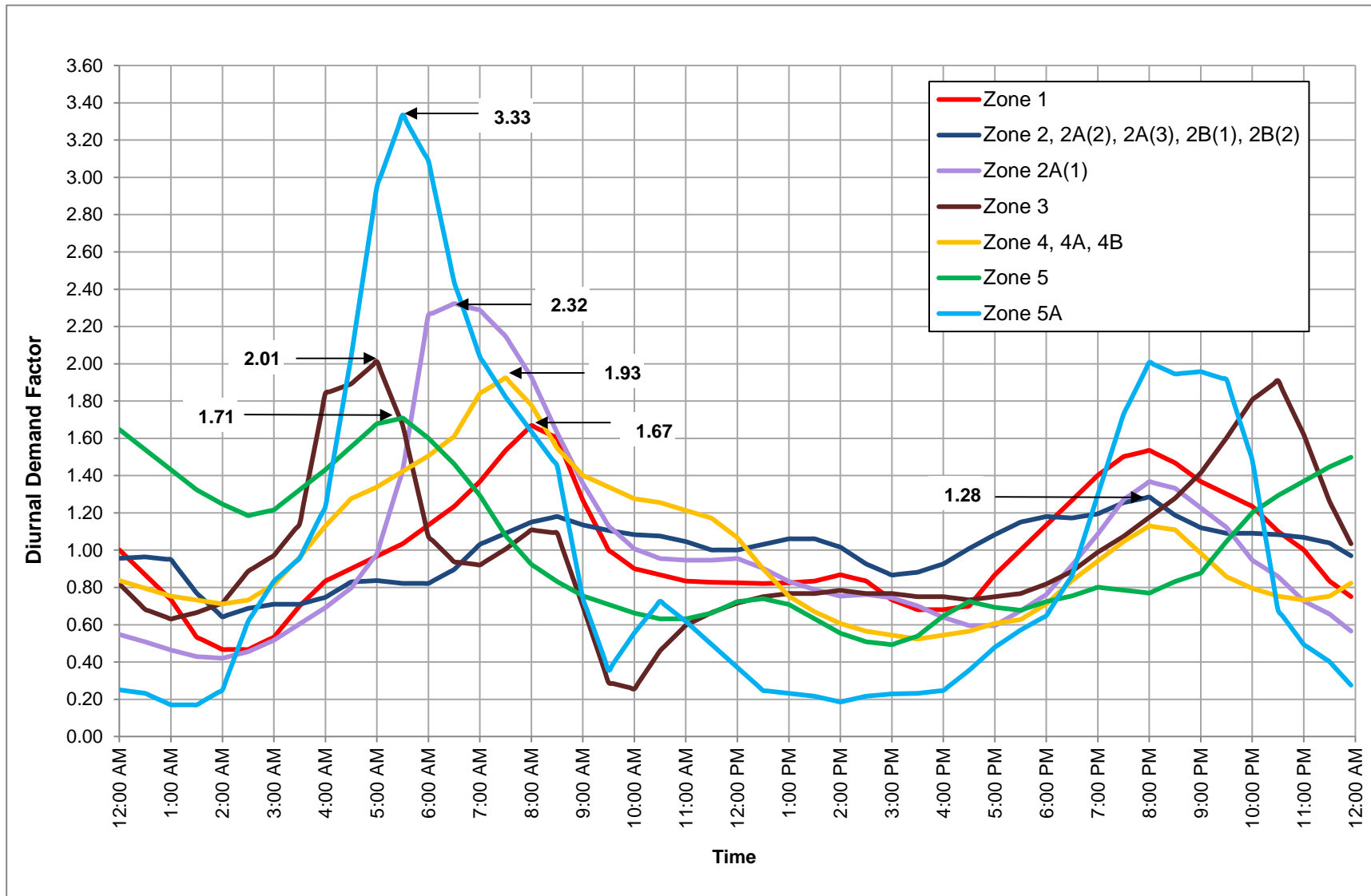
- Zone 1
- Zone 2, 2A(2), 2A(3), 2B(1), and 2B(2) combined
- Zone 2A(1)
- Zone 3
- Zone 4, 4A, and 4B combined
- Zone 5
- Zone 5A

The peak hour factor is higher in the zones with small demands such as Zone 2A(1) and Zone 5A. This is typical in residential areas with small demands as residents tend to use water at similar times. Zones with larger demands and a mix of land uses within the zone, tend to have lower peak daily factors, such as Zone 2.

4-4 Existing System Demands and Peaking Factors

It is important to evaluate a water system during various incremental peak demands. Typically, a water system is designed to meet the maximum demands placed on it. The system components must be designed to cope with these demands as they occur. Maximum month and maximum day demands are important factors in sizing a system's supply capability. Maximum day demands usually dictate the design criteria for both system transmission and storage needs. Peak hour criterion is a measure of the system's overall adequacy with respect to its transmission and distribution elements, as well as its operational storage capacity. The City of Monterey Park's water system demands utilized in this study are shown in Table 4-5. Demand estimates by zone are shown in Table 4-6.

Figure 4-3
Diurnal Curves



**Table 4-5
Water System Demands and Peaking Factors**

Demand Description	Existing Demand			Peaking Factor
	(gpm)	(mgd)	(AFY)	
Minimum Month	3,410	4.91	5,500	0.75
Average Day	4,547	6.55	7,333	1.00
Maximum Month	5,411	7.79	8,726	1.19
Maximum Day	6,593	9.49	10,633	1.45
Peak Hour	8,236	11.86	13,283	1.81

Notes:

Specific Demand = Average Day Demand x Peaking Factor

Peak Hour demand is calculated via hydraulic model combining diurnal patterns for all hydraulic zones

Demand estimates by zone are shown in Table 4-6.

Average Day

The average day demand is based on the City of Monterey Park’s water supply production records for the past five years (2018-2022). As shown in Table 4-4, the average day demand is approximately 4,547 gpm (6.55 mgd; 7,333 AFY).

Minimum Month

The minimum month peaking factor was determined from the City’s annual water supply production records for 2018 through 2022. The minimum month usage is about 0.75 times the average month and typically occurs in January. The minimum month demand is estimated at approximately 3,410 gpm (4.91 mgd; 5,500 AFY).

Maximum Month

The maximum month peaking factor was determined from the City’s annual water supply production records for 2018 through 2022. The maximum month usage is about 1.19 times the average month and typically occurs in August. The maximum month demand is estimated at approximately 5,411 gpm (7.79 mgd; 8,726 AFY).

Maximum Day

The maximum day demands are estimated to be approximately 1.45 times the average day demand or 6,593 gpm (9.49 mgd; 10,633 AFY). This is based on historical daily production and purchase records as shown in Table 4-4.

Peak Hour

The peak hour demands were based upon the diurnal demand curves illustrated on Figure 4-3. The overall peak hour system demand is estimated to be 1.81 times the average day demand or about 8,236 gpm (11.86 mgd; 13,283 AFY). This factor varies by zone depending on the diurnal curve.

**Table 4-6
Water System Demands by Zone**

Zone	Minimum Month ¹			Average Day			Maximum Month ²			Maximum Day ³			Peak Hour ⁴		
	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY
1	458	0.66	739	611	0.88	986	727	1.05	1,173	886	1.28	1,429	1,595	2.30	2,572
2	2,239	3.22	3,611	2,985	4.30	4,814	3,552	5.12	5,729	4,328	6.23	6,981	8,830	12.72	14,241
2A(1)	67	0.10	108	89	0.13	144	106	0.15	171	129	0.19	208	336	0.48	542
2A(2)	45	0.06	72	60	0.09	96	71	0.10	115	87	0.12	140	225	0.32	363
2A(3)	24	0.03	39	32	0.05	51	38	0.05	61	46	0.07	74	120	0.17	194
2B(1)	20	0.03	33	27	0.04	43	32	0.05	52	39	0.06	63	80	0.11	129
2B(2)	5	0.01	8	7	0.01	11	8	0.01	13	10	0.01	16	21	0.03	33
3	177	0.26	286	236	0.34	381	281	0.40	453	342	0.49	552	699	1.01	1,127
4	55	0.08	88	73	0.10	118	87	0.12	140	106	0.15	170	216	0.31	348
4A	78	0.11	125	104	0.15	167	123	0.18	199	150	0.22	242	349	0.50	562
4B	25	0.04	41	34	0.05	55	40	0.06	65	49	0.07	79	114	0.16	184
5	207	0.30	334	276	0.40	446	329	0.47	530	401	0.58	646	1,001	1.44	1,615
5A	9	0.01	14	12	0.02	19	14	0.02	23	17	0.02	28	44	0.06	71
Total	3,410	4.91	5,500	4,547	6.55	7,333	5,411	7.79	8,726	6,593	9.49	10,633	8,236	11.86	13,283

¹ Minimum Month Demand shown is calculated using minimum month factor of 0.75.

² Maximum Month Demand shown is calculated using maximum month factor of 1.19.

³ Maximum Day Demand shown is calculated using maximum day factor of 1.45.

⁴ Peak Hour Demand shown is equal to maximum day demand x highest diurnal demand factor for that zone

The total Peak Hour Demand for the system is not equivalent to the sum of the peak hour demands for each zone because the peak demands occur at different times in different zones (dependent on the diurnal curve)

4-5 Water Unit Demand Factors

Water unit demand factors were developed from the 2021 billing data and associated land use information. It is assumed that this water use represents some bounce-back from the end of the drought and thus it is believed to be representative of post-drought or more “normal” conditions.

The proposed potable water unit demand factors are shown in Table 4-7. These demand factors were used to estimate future development water use if more detailed information is not available.

**Table 4-7
Water Unit Demand Factors**

Landuse		Density (du/ac)	Demand Factor			
			Min gpd/du	² Min gpd/ac	³ Min gpd/tsf	Min gpd/room
Low Density Residential ¹	LDR	0-8	350	1,320	-	-
Medium Density Residential ¹	MDR	8.1-16	270	2,620	-	-
High Density Residential ¹	HDR	16.1-25	220	4,760	-	-
Commercial	C	-	-	2,000	120	-
Employment/Technology	ET	-	-	800	50	-
Open Space	OS	-	-	1,000	-	-
Public Facilities	PF	-	-	1,000	60	-
Restaurant ⁴	-	-	-	-	1,000	-
Hotel ⁵	-	-	-	-	-	155

¹ The gpd/du should be used if the number of dwelling units is known. The residential gpd/ac will vary based on the density. Use minimum gpd/ac if number of dwelling units is not known. Using the factor in gpd/du will result in a more accurate water demand estimate.

² The gpd/ac is based on 2021 water billing data and associated parcel acreage

³ The commercial gpd/tsf is based on the minimum FAR of 0.40

⁴ The hotel gpd/room is based on typical planning values seen in the Southern California

⁵ Mixed Use demands should be based on the types of landuse that make up the specific area and the unit demand factors provided above.

4-6 Future Demands

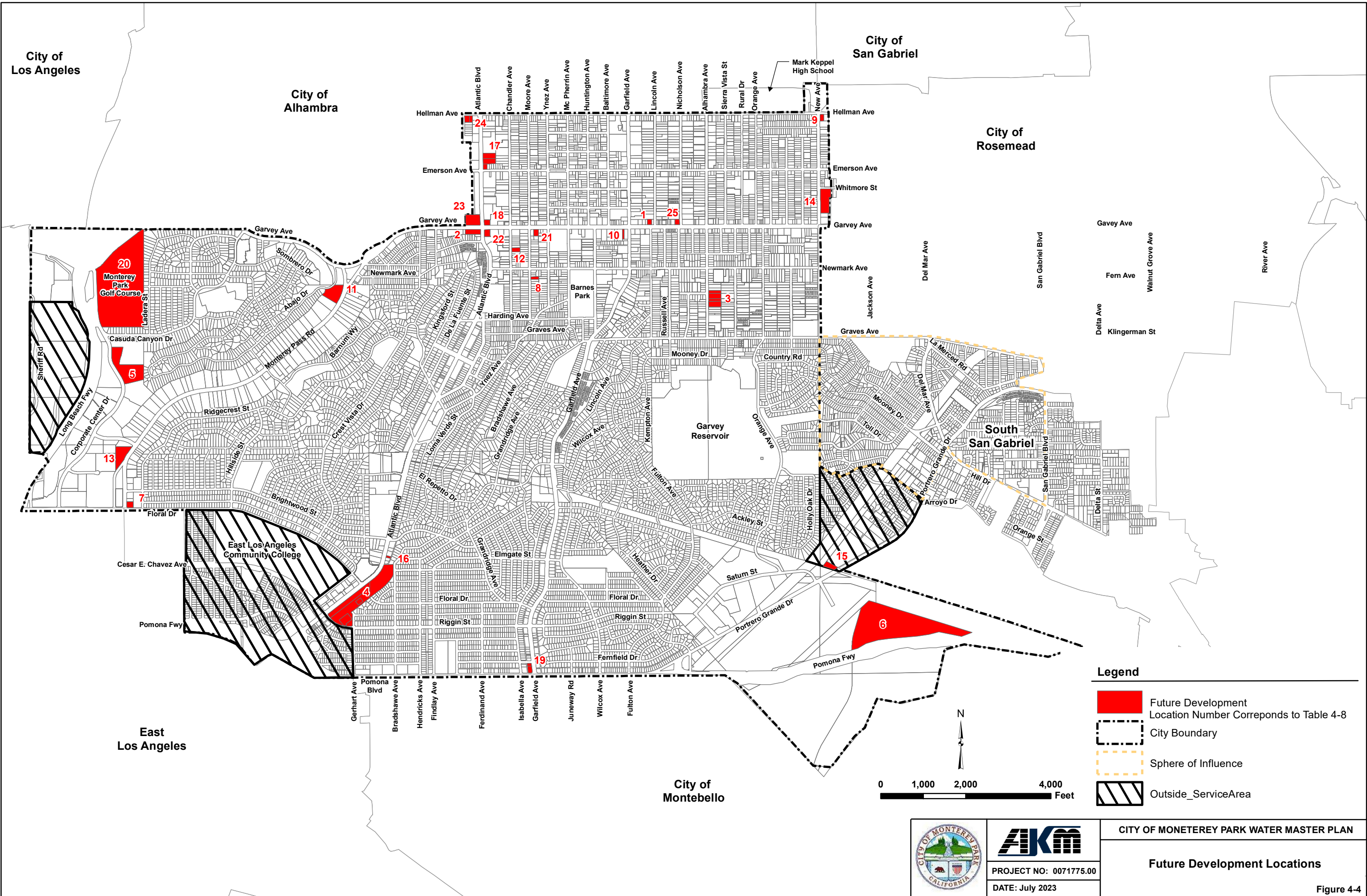
4-6.1 Future Development Demands

The future demands were developed by adding the estimated demands of future known development projects (provided by City staff) to the existing demands. Future development demands are shown in Table 4-8. Associated locations are shown on Figure 4-4. A total of 222,707 gpd of future average water use is estimated to be added throughout the service area. The projected future water system demands by zone are shown in Table 4-9.

**Table 4-8
Future Development Demands**

ID Number	Development	Location	Future Development		Parcel Area (Ac)	Water Demand Factor	Average Day Demand (gpd)	Average Day Demand (gpm)	Zone	Comment
			Landuse Type	Units						
1	Steel Craft Outdoor Eatery	NWC of Garvey Avenue and Lincoln Avenue	Restaurant	4.989 tsf	0.29	1,000 gpd/tsf	4,989	3.464	2	Building area not provided; Assumed FAR=0.40
2	Mixed Use Project	808 Garvey Avenue	HDR	77 du	0.93	220 gpd/du	16,940	11.764	2	Residential units upstairs
			Restaurant	3,000 tsf		1,000 gpd/tsf	3,000	2.083		
3	Senior Housing Project	338-410 Alhambra Avenue	HDR	114 du	2.59	220 gpd/du	25,080	17.417	2	Senior housing
4	Atlantic Square Updates	2000-2276 Atlantic Boulevard	Restaurant	28.621 tsf	14.58	-	-	-	-	Demolish 27,000 SF; no demand added
5	Multi-Family Residential Project	800 Corporate Center Drive	HDR	153 du	7.34	220 gpd/du	33,660	23.375	3	Multi-family residential units
6	Monterey Park Market Place-Phase III	2000 Market Place Drive	Restaurant	-	32.72	-	-	-	-	Modification; no demand added
7	7-Eleven Expansion	1600 Monterey Pass Road	Commercial	0.240 tsf	0.47	-	-	-	-	Expansion of 7/11 convenience store; no demand added
8	3-Unit Condo Conversion	314 South Moore Avenue	MDR	3 du	0.26	270 gpd/du	810	0.563	2	Condominium
9	Service Station + 7-Eleven	616 North New Avenue	Commercial	4.088 tsf	0.31	120 gpd/tsf	491	0.341	2	Convenience Store
10	Town Center (Celadon Project)	114 West Garvey Avenue	Commercial	70,000 tsf	0.21	120 gpd/tsf	8,400	5.833	2	Residential units
			HDR	151 du		220 gpd/du	33,220	23.069		
11	Self-Storage Facility	505 Monterey Pass Road	Commercial	74.750 tsf	2.95	120 gpd/tsf	8,970	6.229	2	Self Storage
12	Senior Housing Development	130-206 Chandler Avenue	HDR	40 du	0.41	220 gpd/du	8,800	6.111	2	Senior Housing Condominiums
13	Self-Storage Facility	2500 Davidson Drive	Commercial	-	2.58	2,000 gpd/ac	5,157	3.581	2	Self Storage
14	Whitmore Villas Townhome Development	126 New Avenue	HDR	63 du	2.80	220 gpd/du	13,860	9.625	2	Townhomes
15	8-Unit Residential Condominium Development	2011 Potrero Grande	HDR	8 du	0.73	-	-	-	-	Condominiums; Outside of water service area; no demand added
16	Raising Canes	1970 South Atlantic Boulevard	Restaurant	1.746 tsf	0.11	1,000 gpd/tsf	1,746	1.213	1	
17	Mixed-Use Project	420 North Atlantic Boulevard	Commercial	5,381 tsf	2.02	120 gpd/tsf	646	0.448	2	Condominiums Holiday Inn
			HDR	84 du		220 gpd/du	18,480	12.833		
			Hotel	136 rooms		155 gpd/room	21,080	14.639		
18	7-Leaves Café	795 West Garvey Avenue	Restaurant	5,000 tsf	0.40	1,000 gpd/tsf	5,000	3.472	2	
19	Shell/Starbucks	2425-2439 Garfield Avenue	Commercial	-	0.51	2,000 gpd/ac	1,026	0.712	1	Gas Station & Café
20	Luminarias Restaurant Remodel	3500 West Ramona Boulevard	Restaurant	-	46.83	-	-	-	-	Remodel; no demand added
21	Garvey Avenue Mixed Use	550 West Garvey Avenue	Mixed use	11.353 tsf	0.40	1,000 gpd/tsf	11,353	7.884	2	Specific use not provided; conservatively assumed restaurant use

Total 222,707 154.657



City of Los Angeles

City of Alhambra

City of San Gabriel

City of Rosemead

20
Monterey Park Golf Course

East Los Angeles Community College

Garvey Reservoir

South San Gabriel

East Los Angeles

City of Montebello

N

0 1,000 2,000 4,000 Feet



AKM
 PROJECT NO: 0071775.00
 DATE: July 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

Future Development Locations

Figure 4-4

**Table 4-9
Future Water Demands by Zone**

Zone	Minimum Month ¹			Average Day			Maximum Month ²			Maximum Day ³			Peak Hour ⁴		
	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY	gpm	mgd	AFY
1	460	0.66	742	613	0.88	989	729	1.05	1,177	889	1.28	1,434	1,600	2.30	2,580
2	2,418	3.48	3,900	3,224	4.64	5,200	3,837	5.52	6,188	4,675	6.73	7,540	9,537	13.73	15,381
2A(1)	67	0.10	108	89	0.13	144	106	0.15	171	129	0.19	208	336	0.48	542
2A(2)	45	0.06	72	60	0.09	96	71	0.10	115	87	0.12	140	225	0.32	363
2A(3)	24	0.03	39	32	0.05	51	38	0.05	61	46	0.07	74	120	0.17	194
2B(1)	20	0.03	33	27	0.04	43	32	0.05	52	39	0.06	63	80	0.11	129
2B(2)	5	0.01	8	7	0.01	11	8	0.01	13	10	0.01	16	21	0.03	33
3	195	0.28	314	260	0.37	419	309	0.44	498	376	0.54	607	768	1.11	1,238
4	55	0.08	88	73	0.10	118	87	0.12	140	106	0.15	170	216	0.31	348
4A	78	0.11	125	104	0.15	167	123	0.18	199	150	0.22	242	349	0.50	562
4B	25	0.04	41	34	0.05	55	40	0.06	65	49	0.07	79	114	0.16	184
5	207	0.30	334	276	0.40	446	329	0.47	530	401	0.58	646	1,001	1.44	1,615
5A	9	0.01	14	12	0.02	19	14	0.02	23	17	0.02	28	44	0.06	71
Total	3,607	5.19	5,818	4,810	6.93	7,757	5,724	8.24	9,231	6,974	10.04	11,248		0.00	0

¹ Minimum Month Demand shown is calculated using minimum month factor of 0.75.

² Maximum Month Demand shown is calculated using maximum month factor of 1.19.

³ Maximum Day Demand shown is calculated using maximum day factor of 1.45.

⁴ Peak Hour Demand shown is equal to maximum day demand x highest diurnal demand factor for that zone

The total Peak Hour Demand for the system is not equivalent to the sum of the peak hour demands for each zone because the peak demands occur at different times in different zones (dependent on the diurnal curve)

4-6.2 Reduction in Indoor Water Use

Senate Bill 606 and Assembly Bill 1668 require reduction in indoor residential water use to 55 gallons per capita per day (gpcd) by January 1, 2025, and 52.5 gpcd by January 1, 2030.

In 2021, the total residential water use was about 4,458,333 gpd and the service area population was 59,473. This equates to an average demand of approximately 75 gpcd. This includes outdoor irrigation and is considered fairly low. Although SB606 and AB1668 requires indoor water use to be reduced to 52.5 gpcd by 2030, it is not expected that the City’s water use will be reduced significantly since it is already so low.

4-6.3 Accessory Dwelling Units

In California, the housing production has not kept pace with the population growth for the last decade. The lack of housing has impacted affordability and caused the average housing cost to rise significantly. Accessory dwelling units (ADUs) provide an alternative to the traditional housing type. ADUs are significantly less expensive to build and offer benefits that address common development barriers such as affordability and environmental quality. ADUs are constructed on parcels with

existing or proposed housing so they don't require new land, dedicated parking, or other costly infrastructure.

New policies that went into effect January 1, 2020 are making ADUs even more affordable to build, in part by limiting the development impact fees and relaxing zoning requirements are as follows:

1. AB 68: A long and detailed bill covering multiple ADU rule changes including permitting adding ADUs and Junior Accessory Dwelling Units (JADUs) to single family properties
2. SB 13: Includes a provision to prohibit a local agency from imposing an owner-occupant requirement for an ADU or main residence until 7/25/22.
3. AB 670: Mandates that neither Home Owners Associations (HOAs) nor property Covenants, Conditions and Restrictions (CC&R) can reasonably prohibit development of an ADU or JADU.
4. AB 881: Includes provisions to permit ADUs in multi-family dwelling structures.
5. AB 587: Permits ADUs to be sold separately from primary residence if the property was developed by a qualified non-profit corporation and certain affordable housing requirements are met for the ADU sale.
6. AB 671: Requires local agencies to include a plan that incentivizes and promotes the creation of ADUs that can be offered at affordable rent in its housing element.

California Senate Bill 9 (SB9) became law January 1, 2022. It amended Section 66452.6 and added Sections 65852.21 and 66411.7 of the California Government Code relating to land use and subdivisions. SB 9 provides two new pathways for homeowners to create additional dwelling units: subdivide a single family lot and build up to two residential units on each or add residential units on lots that are not split. Under SB 9, local agencies must ministerially approve applications without discretionary review.

There are currently 10,397 single family residential water meters in the system. The City approved 51 ADUs (0.49% of total single family units) in 2021 and 57 ADUs (0.55% of total single family units) in 2022, respectively. Although, currently the number of ADUs are a small percentage of the total, it is expected that the number of ADUs will continue to trend upwards and increase in subsequent years.

For planning purposes, the future demand increase due to ADUs can be estimated depending on the percentage of single family parcels that are assumed to add an ADU in the future. If an average ADU has an occupancy of two people, the total ADU demand would be estimated at about 105 gpd (2 x 52.5 gpcd). Possible demand increases are calculated as follows:

1. If 10% of the total 10,397 single family parcels add an ADU = 1,040 ADUs
 Additional demand = 1,040 ADU x 105 gpd/ADU = 109,200 gpd = 122 AFY
2. If 20% of the total 10,397 single family parcels add an ADU = 2,079 ADUs
 Additional demand = 2,079 ADU x 105 gpd/ADU = 218,295 gpd = 244 AFY
3. If 30% of the total 10,397 single family parcels add an ADU = 3,119 ADUs
 Additional demand = 3,119 ADU x 105 gpd/ADU = 327,495 gpd = 367 AFY

The City's 2020 Urban Water Management Plan (UWMP) estimated an increase in population from 59,473 in 2020 to 62,876 in 2045 per SCAG data. The residential demands are expected to increase from 5,386 AFY in 2020 to 5,632 AFY in 2045. This is an increase of 246 AFY or 219,643 gpd. This is about the same as assuming that 20% of the single family parcels adding an ADU.

4-7 Water Conservation

At the time of this report writing, the City of Monterey Park was implementing Stage 2 of its Water Conservation Regulations (Ordinance No. 2214, adopted 9/15/21).

The following general regulations apply to all water customers:

1. Lawn / Landscape Watering
 - a. No watering between 9 AM and 5 PM
 - b. No watering any lawn or landscaping more than once a day
 - c. No watering any lawn or landscaping with 48 hours after measurable precipitation
 - d. No watering any lawn or landscaping to such an extent that runoff into any adjoining street, parking lot or alley occurs
 - e. All hoses, faucets and sprinkling system must be inspected for leaks
 - f. Leaks must be repaired as soon as reasonably practicable
2. Indoor Plumbing and Fixtures
 - a. All accessible indoor plumbing and faucets must be inspected for leaks
 - b. All leaks must be repaired as soon as reasonable practicable, but not later than seven days after receiving a notice of violation from the Director
3. Washing Vehicles
 - a. Vehicles must be washed at a commercial carwash, using reclaimed water, or by using a hand-held bucket or a water hose equipped with an automatic shutoff nozzle
4. Running Hoses
 - a. Leaving a water hose running while washing a vehicle or at any other time is prohibited.
5. Public Eating Places
 - a. Serving water to any customer is prohibited unless specifically requested to do so by such customer.
6. Linen Services
 - a. Commercial lodging establishments must offer guests the option of declining daily bed linen and towel laundry services.
7. Decorative Fountains
 - a. Water used to clean, fill, or maintain levels in any decorative fountain, pond, lake or other similar aesthetic structure must flow through a recycling system

8. New Car Washes and New Commercial Laundromat Facilities

- a. Non re-circulating water systems are prohibited

9. Single Pass Cooling Systems

- a. Installation of single pass cooling systems in new commercial building is prohibited.

The City maintains water conservation information on their website (<https://www.montereypark.ca.gov>) for viewing by the public. The City's website also provides a link to Ordinance No. 2214, Water Conservation Regulations, which lists the regulations for all stages of drought emergency.

**SECTION 5
EXISTING SYSTEM**

5-1 General

The City of Monterey Park’s domestic water system consists of:

- 5 primary pressure zones
- 8 closed sub-zones
- 134.7 miles of transmission and distribution system pipe ranging in size from 2-inch to 24-inches in diameter
- 8 active wells, 4 inactive wells
- 11 service zone storage reservoirs
- 2 settling tanks
- 11 booster pump stations (3 hydropneumatic)
- 19 pressure reducing stations
- 1 imported water supply connection
- 4 emergency interconnections
- 14,018 water meter connections

**Table 5-1
Water Meter Type**

Meter Type	Number of Meters ¹
Single Family Residential	10,400
Multiple Family Residential	1,716
Lifeline	520
Landscape Irrigation	144
Institutional	13
Commercial	1,142
City Meter	83
Total	14,018

¹ Data used was from 2021 billing database

A breakdown of the water meter types is shown in Table 5-1. The existing potable water system is shown on Figure 5-1. The hydraulic schematic of the existing water system is shown on Figure 5-2.

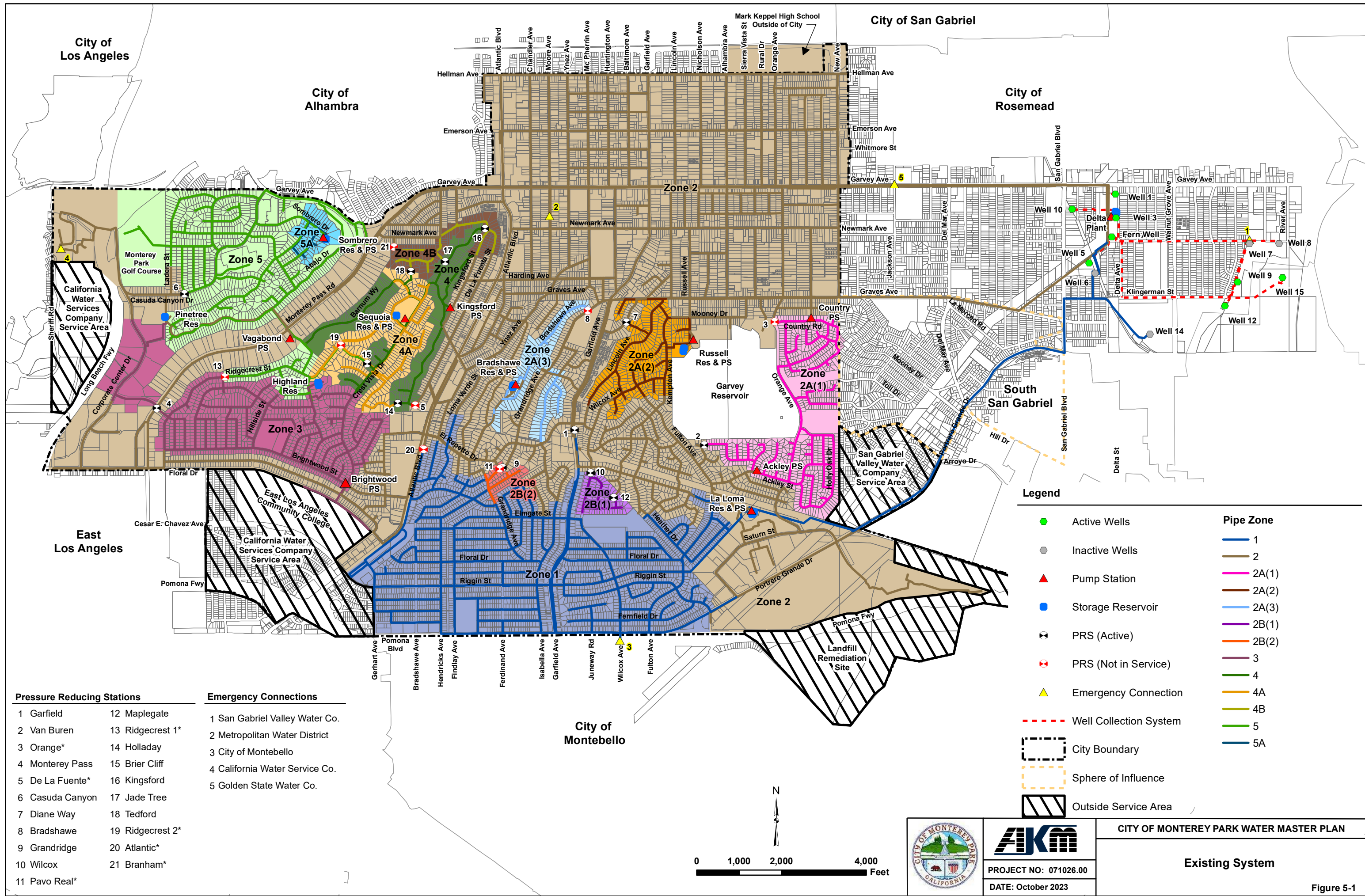
5-2 Pressure Zones

To accommodate the variation in the service area elevations, the City’s water system consists of five primary pressure zones and eight closed sub-zones, the boundaries of which can be seen on Figure 5-1. Details of each pressure Zone are shown in Table 5-2.

Zone 5 is highest in service elevation and Zone 1 is lowest in service elevation. Zone 2 is the largest zone in terms of area and demand. It physically covers about 1,943 net acres of the City and has an average demand of about 2,985 gpm.

**Table 5-2
City of Monterey Park Pressure Zones**

Pressure Zone Name	Area (Ac)	Pipe Length (ft) ¹	Average Day Demand (gpm)	Hydraulic Grade Line (ft)	Service Elevation (ft)		Static Pressure Range ²	
					Min	Max	Min	Max
1	437	136,699	611	466	253	378	38	92
2	1,943	384,843	2,985	567	278	498	30	125
2A(1)	134	27,441	89	640	437	542	42	88
2A(2)	73	15,080	60	665	449	555	47	94
2A(3)	46	8,108	32	655	442	532	53	92
2B(1)	17	3,162	27	510	316	378	57	84
2B(2)	8	2,328	7	467	320	389	38	68
3	220	45,356	236	639	342	560	34	129
4	82	16,260	73	692	444	597	41	107
4A	84	15,954	104	816	513	699	51	131
4B	32	6,771	34	650	437	547	45	92
5	281	50,063	276	736	418	681	24	138
5A	21	2,864	12	805	614	691	49	83
Total	3,379	714,927	4,546					



Pressure Reducing Stations	
1 Garfield	12 Maplegate
2 Van Buren	13 Ridgcrest 1*
3 Orange*	14 Holladay
4 Monterey Pass	15 Brier Cliff
5 De La Fuente*	16 Kingsford
6 Casuda Canyon	17 Jade Tree
7 Diane Way	18 Tedford
8 Bradshawe	19 Ridgcrest 2*
9 Grandridge	20 Atlantic*
10 Wilcox	21 Branham*
11 Pavo Real*	

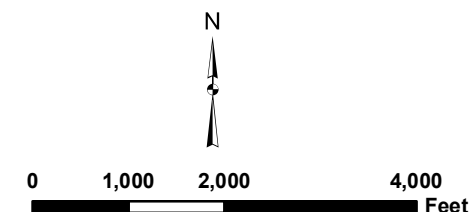
Emergency Connections	
1 San Gabriel Valley Water Co.	
2 Metropolitan Water District	
3 City of Montebello	
4 California Water Service Co.	
5 Golden State Water Co.	


Legend

- Active Wells
- Inactive Wells
- ▲ Pump Station
- Storage Reservoir
- ⊗ PRS (Active)
- ⊗ PRS (Not in Service)
- ▲ Emergency Connection
- Well Collection System
- City Boundary
- Sphere of Influence
- Outside Service Area


Pipe Zone

- 1
- 2
- 2A(1)
- 2A(2)
- 2A(3)
- 2B(1)
- 2B(2)
- 3
- 4
- 4A
- 4B
- 5
- 5A





CITY OF MONTEREY PARK

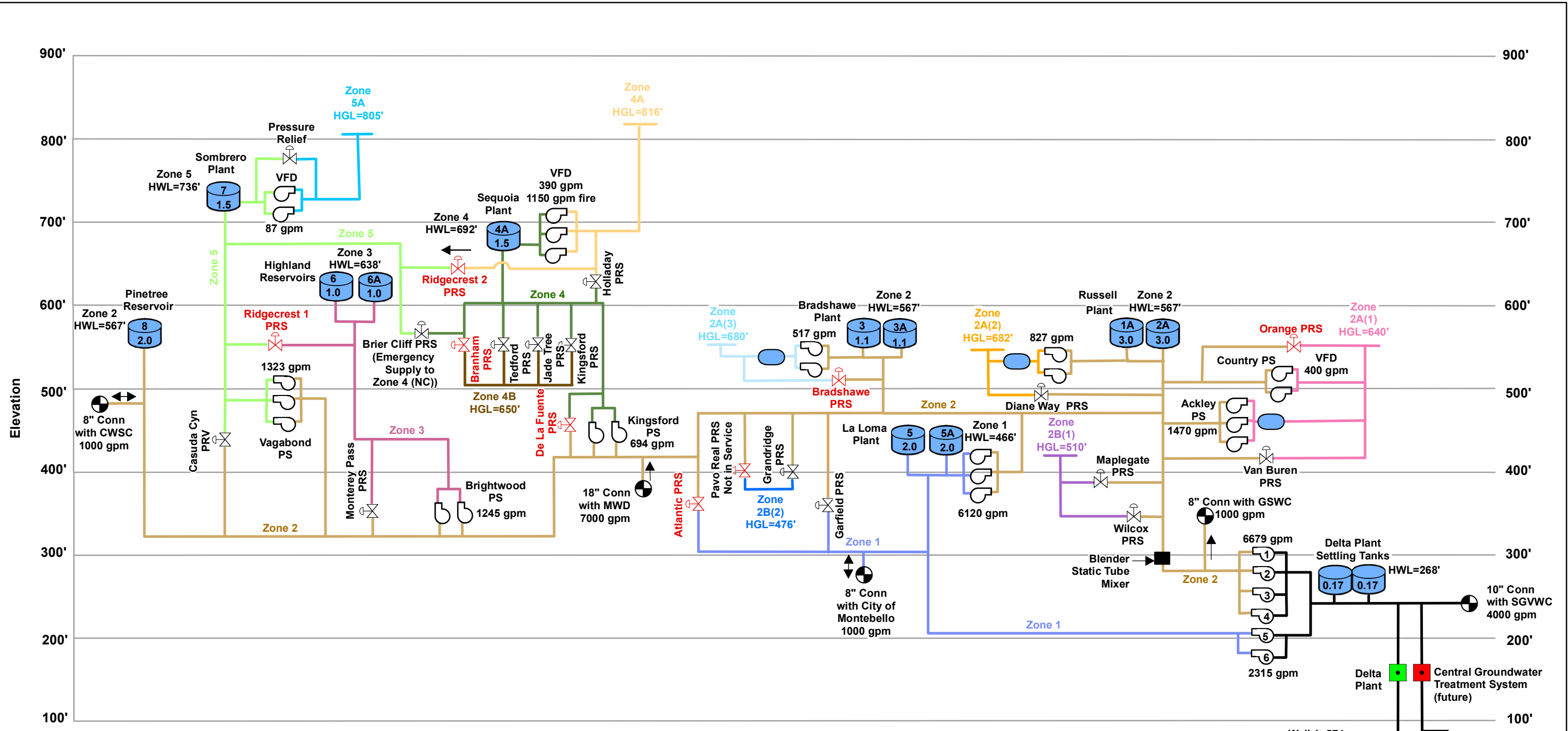


PROJECT NO: 071026.00
DATE: October 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

Existing System

Figure 5-1



Legend

- Reservoir Designation
- Reservoir Volume in mgd
- Hydropneumatic Tank
- Booster Pump with PS Firm Capacity (Available Pump Efficiency Test)
- PRS (Active)
- PRS (Not in Service)
- Well with Design Capacity in gpm
- Emergency Connection with Estimated Capacity in gpm

- Delta Plant
- Central Groundwater Treatment System (Future)
- CWSC California Water Services Company
- GSWC Golden State Water Company
- HWL High Water Level
- MWD Metropolitan Water District
- NC Normally Closed
- PS Pump Station

- Zone 1
- Zone 2
- Zone 2A(1)
- Zone 2A(2)
- Zone 2A(3)
- Zone 2B(1)
- Zone 2B(2)
- Zone 3
- Zone 4
- Zone 4A
- Zone 4B
- Zone 5
- Zone 5A

- Well 1: 574 gpm
- Well 3: 745 gpm
- Well 10: 1332 gpm
- Fern: 965 gpm
- Well 5: 775 gpm
- Well 9: 1758 gpm
- Well 12: 2050 gpm
- Well 15: 2435 gpm

Notes: Wells 6, 7, 8, and 14 are inactive

		CITY OF MONTEREY PARK WATER MASTER PLAN
	PROJECT NO: 071026.00 DATE: October 2023	Hydraulic Schematic

Figure 5-2

5-3 Transmission and Distribution System

The potable water system includes approximately 711,119 feet (134.7 miles) of transmission and distribution system pipes ranging in size from 2-inches to 24-inches in diameter. There is a system of well collection lines located in the City of Rosemead that conveys well water to the Delta Plant, also located in the City of Rosemead. There are four main transmission lines from the Delta Plant to the system: an 18-inch and 10-inch line in Garvey Avenue to Zone 2, an 18-inch line in Graves Avenue to Zone 2, and a 24-inch line in Portrero Grande Drive to Zone 1.

Approximately 29.1 percent of the water mains are 6-inch and 29.5 percent are 8-inch. A summary of the system pipes by diameter is shown on Figure 5-3.

**Figure 5-3
Pipe Length by Size**

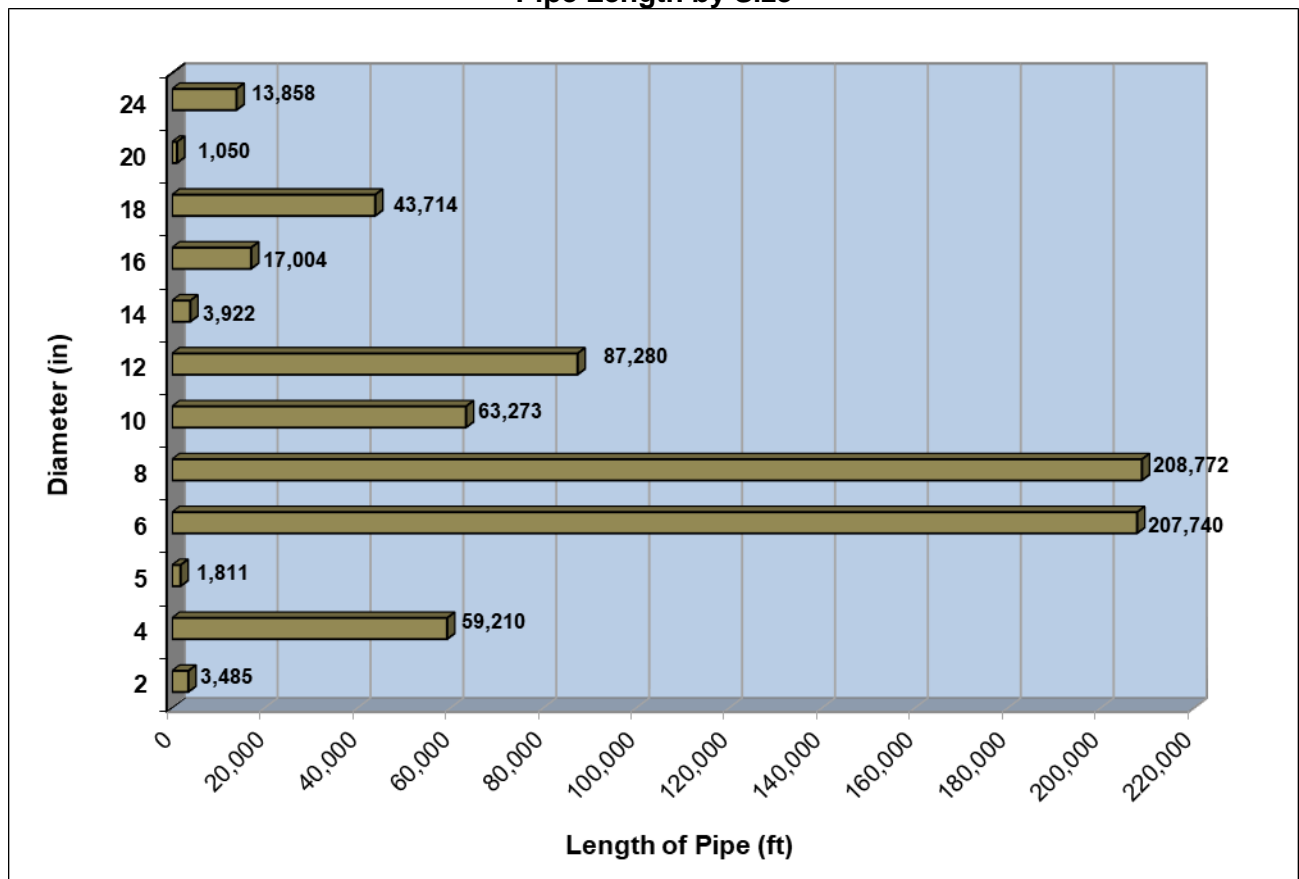
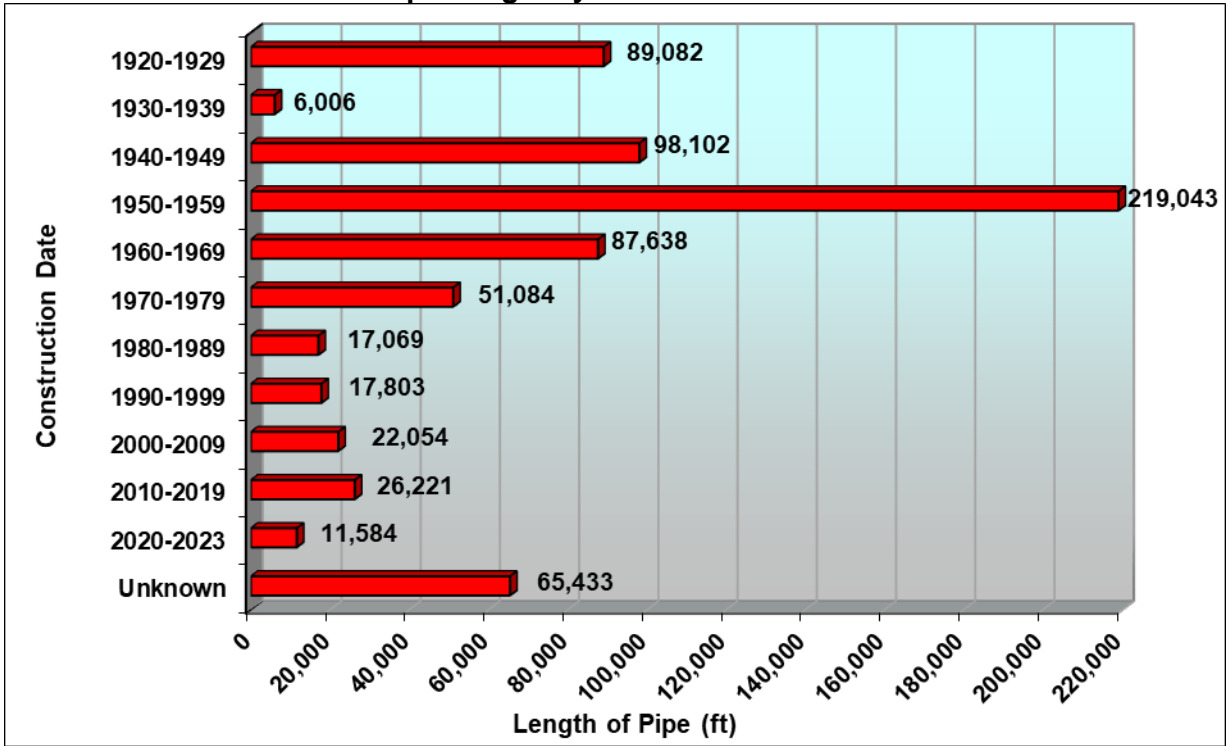
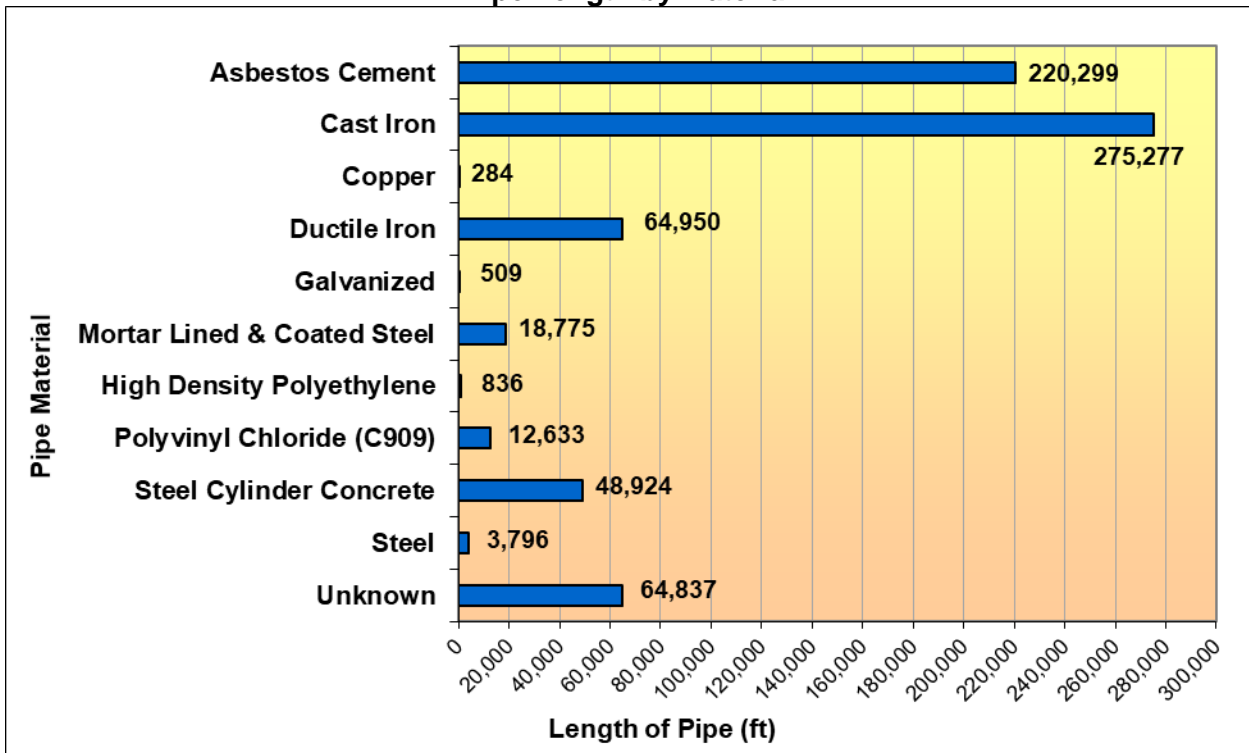


Figure 5-4 and Figure 5-5 show the pipe length constructed by date and pipe material. Approximately 27.2 percent of the system was constructed before 1950 and 30.8 percent of the system was installed during the 1950's. About 38.7 percent of the system pipes are made of cast iron and 31.0 percent are made of asbestos cement.

**Figure 5-4
Pipe Length by Construction Date**



**Figure 5-5
Pipe Length by Material**



5-4 Storage Reservoirs

The water system consists of thirteen (13) reservoirs, including the two settling tanks located at the Delta Plant. The reservoirs range in size from 0.17 MG to 3.0 MG. The City's total reservoir capacity is 19.66 MG. More than half of the storage is located within Zone 2, the largest service zone. The hydraulic gradient in each of the five primary zones is controlled by the high water elevation of the reservoirs that feed the zones by gravity. Existing reservoir data is shown in Table 5-3.

5-5 Booster Pump Stations

The water system includes eleven (11) booster pump stations. The primary pump station that feeds the well water to the system is located at the Delta Plant. It has six large pumps that pump into Zone 1 and Zone 2 directly. The other ten pump stations convey water up to higher service zones. There are three hydropneumatic pump stations serving Zone 2A(1), 2A(2), and 2A(3). Existing booster pump station data is shown in Table 5-4.

5-6 Wells

The City owns twelve (12) wells. Eight wells are currently active. There are four inactive wells (Well 6, 7, 8, and 14). All wells are located in the City of Rosemead over the Main San Gabriel Basin. Existing well data is shown in Table 5-5.

It should be noted that five of the eight existing wells are reaching the end of their useful lives as they were drilled in 1924, 1946, 1960, 1961, and 1968. It is recommended that the City plan for the replacement of these wells in the near term.

5-7 Water Treatment

Historically, the City operated three water treatment facilities for VOCs and/or perchlorate. The three treatment facilities were as follows:

1. Wells 1, 3, 10, and Fern Treatment Facility at the Delta Plant
2. Well 5 Treatment Facility at the Well 5 Site
3. Wells 9, 12, and 15 Treatment Facility at the Well 12 Site and the Delta Plant



Photograph 5-1 Well 1, 3, 10, and Fern Treatment Facility

The treatment of water will change once the Central Groundwater Treatment System (CTGS) is completed. Water from Well 5, 9, 12, and 15 will be treated at the CGTS. See Section 3-1.4 for a detailed description of the City's plans for future water treatment prior to distribution.

**Table 5-3
Existing Reservoir Data**

Service Zone	Reservoir Site Name	Reservoir No.	Volume (MG)	Bottom of Tank Elevation (ft)	High Water Elevation (ft)	Shape	Dia (ft)	Construction Type	Date of Plan	Water Source	Plan No.	Year of Plan	Cathodic Protection	Seismic Valve	Comments
1 & 2	Delta	2	0.17	260.0	268.0	Circular	60	Concrete	1958	Wells	M-772		-	-	Settling Tanks
		3	0.17	260.0	268.0	Circular	60	Concrete	1958					-	
Total Delta Plant			0.34												
1	La Loma	5	2.00	440.0	465.0	Circular	120	Steel	1954	Delta Pumps 5 & 6	M-750	4/12/1954	Yes	-	
		5A	2.04	439.6	465.6	Circular	120	Steel	2002		D-1267		Yes	Yes	
Total Zone 1			4.04												
2	Russell	1A	3.0	544.5	567.5	Circular	146	Steel	1980	Delta Pumps 1, 2, 3, & 4	D-900	9/30/1980	Yes	Yes	Existign reservoirs planned for rehabilitation
		2A	3.0	544.5	567.5	Circular	146	Steel	1986		D-1023	5/22/1986	Yes	Yes	
2	Bradshawe	3	1.148	543.16	567.16	Circular	90	Concrete	1948	Delta Pumps 1, 2, 3, & 4	D-221	8/23/1948	-	-	Partially Buried Tanks
		3A	1.135	544.3	567.3	Circular	92	Concrete	1958		D-315	9/16/1959	-	-	
2	Pinetree	8	2.0	544.0	567.0	Circular	120	Steel	1974	Delta Pumps 1, 2, 3, & 4	D-745	10/1/1974	Yes	-	
Total Zone 2			10.28												
3	Highland	6	1.00	615.0	638.00	Circular	90	Steel	1958	Brightwood PS	D-256	1/23/1958	Yes	-	Assumed datum difference in plans; Use elevations from Res 6a, and overflow level of 23' from Res 6 plans.
		6A	1.00	615.0	638.00	Circular	90	Steel	2000		D-1268		Yes	Yes	
Total Zone 3			2.00												
4	Sequoia	4A	1.50	660.9	692.00	Circular	90.5	Concrete	1967	Kingsford PS	D-549		-	-	
Total Zone 4			1.50												
5	Sombrero	7	1.50	702.5	735.67	Circular	92	Steel	1990	Vagabond PS	D-1058	3/31/1991	Yes	Yes	
Total Zone 5			1.50												
Total			19.66												

**Table 5-4
Existing Booster Pump Station Data**

No.	Pump Station Name	Location	Date of Const.	Pump No.	Suction Zone	Discharge Zone	Pump Curve Date	Pump Mfg	Pump Model	Pump Type	Stages	Pump Capacity (gpm)	Design Pump Capacity (gpm)	Design TDH (ft)	Pump Motor RPM	Horse Power	Edison Test Date	Edison Test Capacity (gpm)	Edison Test TDH	VFD (Y/N)	Hydropneumatic System (Y/N)	Plan No.
1	Delta	2657 N Delta Ave	1975	1	Wells	2	12/01/81	Layne/VertiLine	16EHL	16" Vertical Turbine	4		2258	302	1780	200	10/30/19	2,187	301.5	N	N	M-772
				2			10/14/09	Flowserve	14EMM	14" Vertical Turbine	4		1800	356	1800	200	10/30/19	2,399	304.0	N	N	
				3			08/02/11	Flowserve	14EMM	14" Vertical Turbine	4		1800	355	1800	200	10/30/19	2,242	306.1	N	N	
				4			09/25/08	Flowserve	14EMM	14" Vertical Turbine	4		1800	360	1800	250	10/30/19	2,250	305.6	N	N	
				5		12/01/81	Layne/VertiLine	16EHM	16" Vertical Turbine	3		2700	197.5	1780	200	10/30/19	2,774	210.0	N	N		
				6		12/01/19	Layne/VertiLine	16EHL	16" Vertical Turbine	3		2360	201.5	1770	150	10/30/19	2,315	206.1	N	N		
2	La Loma	1980 Clover Dr	1957	1	1	2		Layne/VertiLine	14R	14" Vertical Turbine					1782	125	6/30/22	3,120	136.5	N	N	M-772
				2			Layne/VertiLine	14R	14" Vertical Turbine					1783	125	6/30/22	3,000	133.7	N	N		
				3			03/01/88	Layne/VertiLine	14R	14" Vertical Turbine	2		2200	172	1800	125	11/20/19	3,143	131.4	N	N	
3	Country	901 Country Rd	2003	1	2	2A(1)	05/22/03	Hydroflow	9EC	8" Vertical Turbine	2		400	104	1770	20	9/28/22	283	79.5	Y	N	
				2			05/22/03	Goulds	9RCLC	10" Vertical Turbine	3		400	100	1800	20	9/28/22	260	76.2	Y	N	
4	Ackley	567 Ackley St	1961	1	2	2A(1)		Layne/VertiLine	10R4	6" Submersible	4	600	882	60	1800	25	12/11/19	783	89.6	N	Y	D-368
				2			Layne/VertiLine	10R4	10" Submersible	4	600	884	58.3	1800	25	12/11/19	756	100.9	N	Y		
				3			Layne/VertiLine	10RL	10" Submersible	4	600	861	64.7	1800	25	9/21/22	714	93.3	N	Y		
5	Russell	750 S. Russell Ave		1	2	2A(2)	07/24/18	Goulds	9THC	10" Submersible	5		800	151	1738	50	1/8/20	827	101.4	N	Y	
				2			10/27/05	Goulds	12RJLC	8" Submersible	3		800	153	1800	50	1/8/20	1,030	100.5	N	Y	
6	Bradshawe	1009 S. Bradshawe Ave	1993	1	2	2A(3)		Fairbanks Morse		3" Horizontal Centrifugal	1		543	68.1	3510	25	1/8/20	568	88.7	N	Y	
				2			Fairbanks Morse		3" Horizontal Centrifugal	1		543	68.1	3505	25	1/8/20	517	91.7	N	Y		
7	Brightwood	1201 Brightwood St	1963/1989	1	2	3		Byron Jackson	12HORL	12" Submersible	2	1100	1800	88	1760	50	11/16/22	1,340	96.8	N	N	D-445
				2			Byron Jackson	12HORL	12" Submersible	2	1100	1800	88	1750	50	11/16/22	1,245	102.6	N	N		
8	Kingsford	705 Kingsford St		1	2	4	06/01/89	Aurora	410	4" Horizontal Centrifugal			775	150	3500	50	8/15/22	694	164.7	N	N	
				2			Aurora	411 BF	4" Horizontal Centrifugal			775	150	3500	40	8/15/22	721	183.0	N	N		
9	Sequoia	736 Crest Vista Dr	2000	1	4	4A	03/01/88	Flowserve	8MQL	8" Vertical Turbine	6		300	165	1800	20	7/1/22	390	132.6	Y	N	D-1251
				2			03/01/88	Flowserve	8MQL	8" Vertical Turbine	6		300	165	1800	20	-	-	-	Y	N	
				3			03/01/88	Flowserve	13MQH	12" Vertical Turbine	2		1500	157	1800	75	7/1/22	1,150	147.8	Y	N	
10	Vagabond	1490 Vagabond Rd	1960	1	2	5	02/08/21	Goulds	12C	8" Submersible	4		800	200	1740	50	11/13/19	577	182.7	N	N	D-356
				2			10/28/05	Christensen Pumps	11CLC	8" Submersible	4		700	200	1800	50	11/13/19	746	189.7	N	N	
				3				Sulzer		10" Submersible						50	11/13/19	758	189.9	N	N	
11	Sombbrero	1310 Sombbrero Dr	1961	1	5	5A		Goulds	4SVBK2	3" Submersible	2				3450	5	7/1/22	90	90.6	Y	N	D-373
				2			Goulds	4SVBK2	3" Submersible	2						3450	5	7/1/22	87	95.2	Y	

**Table 5-5
Existing Well Data**

Well ID	Location	Status	Treatment	Year Drilled	Size (in)	Ground Elev (ft)	Well Depth (Feet)	Pump Depth (Feet)	Pump Mfg	Pump Model	No of Stages	Pump RPM	Motor HP	Design Capacity (gpm)	Edison Test Date	Edison Test TDH	Edison Test Capacity (gpm)	Comment
1	2745 N Delta Ave	Active	Delta	1924	12	265	410	144	Flowserve	10EBL	11	1800	100	900	11/6/19	214.4	574	VOCs present; Discharges to GAC treatment Plant
3	2657 N Delta Ave	Active	Delta	1946	16	261	1,110	N.A.	Goulds	10RJHC	5	1760	75	600	11/6/19	241	745	VOCs present; Discharges to GAC treatment Plant
5	2450 N Charlotte Ave	Active	Future CGTS	1972	18	259	610	281	Layne Christensen	14RJMC	7	1800	300	2,000	11/13/19	482	775	Discharges directly to Zone 2
9	8830 Fern Ave	Active	Future CGTS	1960	16	233	1,600	222	Flowserve				150	1,800	10/16/19	184.7	1,758	Perchlorates and VOCs present; Part of Superfund Site
10	2719 Gladys Ave	Active	Delta	1961	20	269	670	229	Byron Jackson			1780	150	1,800	10/9/19	263.5	1,332	VOCs present; Discharges to GAC treatment Plant
Fern	2657 N Delta Ave	Active	Delta	1988	20	261	1,190	400	Flowserve	13MQH		1770	125	1,000	11/6/19	267.7	965	
12	8815 Klingerman St	Active	Future CGTS	1968	20	233	817	180	Byron Jackson	15MQH	2	1770	200	2,500	11/9/19	176.6	2,050	Perchlorates and VOCs present; Part of Superfund Site
15	8815 Klingerman St	Active	Future CGTS	2003	16	230		-	Hydroflow	14M	4	1775	250	2,500	10/16/19	246.2	2,435	Perchlorates and VOCs present; Part of Superfund Site
Total Capacity																13,100		

*Wells 6, 7, 8, and 14 are inactive

5-8 Pressure Regulating Stations

The City’s system includes twenty-one (21) pressure regulating stations (PRS). The details of each PRS are shown in Table 5-6. There are three sub-zones (Zone 2B(1), 2B(2) and 4B) that are fed water entirely through pressure regulating stations. Besides the valves at these PRS, the remaining pressure reducing valves (PRVs) are normally closed and operate under emergency conditions. For example, if there is a fire, one or more PRVs may open to allow flow from an upper zone to a lower zone.

The Wilcox PRS has a 6-inch valve that is not in service and an operational 2-inch valve.

The De La Fuente, Bradshaw, Ridgecrest 1, and Ridgecrest 2 PRSs are currently not utilizing the valve pressure regulating capabilities and are manually set to the closed position. It is understood that the Orange, Pavo Real, Atlantic and Branham PRSs were physically constructed, but never piloted to operate in the field. It is recommended that a study be conducted for these eight (8) PRSs to identify the work necessary to place these facilities into service.

Grandridge PRS is the only source of water for Zone 2B(2). The Pavo Real PRS is needed to provide redundancy to Zone 2B(2) and increase the fire protection for the zone.

**Table 5-6
Pressure Regulating Stations**

No.	Name	Address	Elevation (ft)	To Zone	From Zone	Diameter (inch)	Existing Setting (psi)	Comment
1	Garfield	1380 Garfield Ave	362.52	1	2	$\frac{10}{4}$	35	
2	Van Buren	429 Van Buren	436	2	2A(1)	6	30	
3	Monterey Pass	1300 Monterey Pass Rd	348	2	3	10	60	
4	Casuda Canyon	530 Casuda Canyon Dr. Grandeza	450.24	2	5	$\frac{8}{4}$	45	
5	Diane Way	131 Diane Way	464	2	2A(2)	8	35	
6	Grandridge	1692 Grandridge Ave	349	2B(2)	2	$\frac{12}{6}$	55	
7	Wilcox	1752 Wilcox Ave	348.7	2B(1)	2	$\frac{6}{2}$	70	6" is currently not in Service
8	Maplegate	1896 Maplegate St	376.35	2B(1)	2	$\frac{6}{2}$	50	
9	Holladay	888 Holladay / Monterey Views	530.68	4	4A	8	66	
10	Brier Cliff	1048 Brier Cliff Way	580	4	5	8	-	Emergency Connection to provide water from Zone 5 to Zone 4

**Table 5-6 (Continued)
Pressure Regulating Stations**

No.	Name	Address	Elevation (ft)	To Zone	From Zone	Diameter (inch)	Existing Setting (psi)	Comment
11	Kingsford	300 Kingsford St/ Montechico Dr	505	4B	4	6	65	
12	Jade Tree	483 Jade Tree Dr	584.25	4B	4	$\frac{6}{2}$	30	
13	Tedford	590 Tedford Way	533.3	4B	4	6	50	
14	De La Fuente	Holladay & 1068 De La Fuente	481	2	4	8	-	Normally Closed ¹
15	Bradshawe	Bradshawe Ave & Grandridge Ave	458.95	2	2A(3)	6	-	Normally Closed ¹
16	Ridgecrest 1	1076 Ridgecrest St and Longhill	568	3	5	6	-	Normally Closed ¹
17	Ridgecrest 2	856 Ridgecrest	680.79	5	4A	8	-	Normally Closed ¹
18	Orange	Orange Ave & Country Rd	445	2	2A(1)	4	-	Not in Service ²
19	Pavo Real	Pavo Real Ave, north of Grandridge Ave.	341	2B (2)	2	6	-	Not in Service ²
20	Atlantic	1480 Atlantic Blvd	358.73	1	2	$\frac{10}{4}$	-	Not in Service ²
21	Branham	1260 Branham St	425.4	4B	4	6	-	Not in Service ²

¹ Pressure regulating valves are set to the closed position. Conduct a study to identify what valve pressure settings are needed to automate the system for fire flow and other emergency scenarios..

² Valves were initially installed, but not set to operate. Conduct a study to identify what valve pressure settings are needed to automate the system for fire flow and other emergency scenarios..

5-9 Agency Interconnections

The City has one active and four emergency interconnections with other water agencies. The agencies with the location, size and capacity are listed in Table 5-7.

The active interconnection is a one-way interconnection from San Gabriel Valley Water Company (SGVWC) to the City with a maximum capacity of 4,000 gpm. As much as possible, the City utilizes groundwater from the Main Basin to meet its system demands. This is made possible by the treatment, discussed in Section 5-7.

The four other interconnections are in place for emergency purposes only. These interconnections are between the City and Golden State Water Company (GSWC), Metropolitan Water District of Southern California (MWD), California Water Service Company (CWSC), and the City of Montebello. These interconnections are not used on a regular basis due to the fact that the City’s system utilizes free chlorine and the other systems utilize total chlorine.

**Table 5-7
Agency Interconnections**

No.	Agency	Size (in)	Capacity (gpm)	Pressure Zone	Location	Status	Comments
1	San Gabriel Valley Water Company (SGVWC)	10	4,000	1 or 2	Vicinity of City's Well No. 7. 8830 e Fern Asve. Rosemead	Interconnection	Source of Supply only for City; Used to supplement well water during high demand; Drawing D-1296
2	Metropolitan Water District (MWD)	18	7,000	2	Moore Avenue, north of Newmark Avenue	Emergency Connection	Source of Supply only for City; MWD uses chloramines and cannot be mixed with City's water due to use of free chlorine
3	City of Montebello	8	1,000	1	Intersection of Wilcox Avenue and Pomona Boulevard	Emergency Connection	Primarily to provide water to Montebello due to higher pressure on the Monterey Park side
4	California Water Service Company (CWSC)	8	1,000	2	Ameron Way at Sheriffs Academy in northwest portion of the system	Emergency Connection	Two-Way Connection; CWSC uses chloramines and cannot be mixed with City's water due to use of free chlorine
5	Golden State Water Company (GSWC)	8	1,000	2	Intersection of Garvey Avenue and Jackson Avenue	Emergency Connection	Source of Supply only for GSWC

The City disinfects treated well water with sodium hypochlorite before it is discharged to the Delta Plant Settling Tanks and ultimately pumped into the distribution system. A free chlorine residual of 0.2 mg/l is maintained throughout the distribution system.

GSWC, MWD, and CWSC have disinfection systems consisting of chloramines. Chloramines are produced by mixing chlorine with ammonia. Co-mingling chloraminated water with chlorinated water presents water quality issues.

The chloraminated water will consume the free chlorine ion in the chlorinated water and form complex di- and tri-chloramines that affect the taste and odor of the finished water. This occurs when the chlorine to ammonia ratio exceeds 5:1.

The City typically uses 100% groundwater, but may need to use imported water in an emergency. During such an event, it is recommended that the City switch to 100% imported water, to avoid the co-mingling problems previously identified. Then the water system would experience blended chlorinated and chloraminated water only when the system operations are transitioning from 100% groundwater to 100% imported water, and vice versa.

If the source of supply is changed, it is recommended that the City do the following:

1. Inform the State Water Resources Control Board (SWRCB) Division of Drinking Water (DDW) that the City is changing its source of supply.
2. Increase water sampling. The chlorine residual should be greater than 0.2 PPM and less than 4.0 PPM.

- a. When chlorinated and chloraminated waters are blended, it is anticipated that the chlorine residual might decrease below the minimum requirement.
- b. If the chlorine residuals are decreasing, it is recommended that the City begin flushing the system.
 - When converting to 100% imported water, the City may flush the groundwater from its system.
 - When converting to 100% groundwater, the City may flush the imported water from its system.
3. Prepare for increased pipe breaks. Groundwater temperatures are generally lower than imported water temperatures. When changing the supply source, the water temperature also changes and may cause increased pipe breaks. Additional staffing and/or communications with on-call contractors should be conducted to ensure adequate response to potential pipe breaks.
4. Only when the pH is low/corrosive the City may evaluate introducing an NSF60 certified corrosion inhibitor, such as zinc polyphosphate, to neutralize the pH. The City would need to amend its existing permit with SWRCB DDW if the treatment process is changed to include additives to neutralize the pH.
5. Should the day-to-day operations need to change to include a blend of chlorinated and chloraminated water, the City should evaluate adding on-site chloramination systems to treat the groundwater supply before blending it with imported water. The City would need to amend its existing permit with SWRCB DDW, if the treatment process is changed.

SECTION 6
PERFORMANCE EVALUATION CRITERIA

6-1 General

Performance criteria are established to evaluate the adequacy of various water system components through a systematic analysis, and to identify necessary improvements to the system for inclusion in a Capital Improvement Program (CIP). For the City of Monterey Park's (City) water system, these criteria are generally in accordance with the California Code of Regulations, Title 22. This includes service pressures, storage capacity, and sources of supply. Other criteria are based on federal, state and local jurisdictional requirements.

This section details the criteria which will serve as a benchmark for evaluating the City's water system. A summary of the service criteria is listed in Table 6-1.

Table 6-1
Performance Evaluation Criteria

	Description	Criteria	Existing Requirement
1	Source of Supply (See Section 6-2)		
	a. Total	Maximum Day Demand (except for closed zones which should be Maximum Day Demand plus Fire Flow Demand or Peak Hour, whichever is greater)	6,593 gpm (9.49 mgd)
	b. Local Supply	Average Day Demand	4,547 gpm (6.55 mgd)
2	Reservoir Capacity / Storage (See Section 6-3)		
	a. Operational Storage	30% of Maximum Day Demand	2.85 MG
	b. Emergency Storage	100% of Average Day Demand	6.55 MG
	c. Fire Suppression (See Section 6-8)		
	Low Density Residential	2,000 gpm for 2 hours	0.24 MG
	Medium Density Residential	2,000 gpm for 2 hours	0.24 MG
	High Density Residential	3,000 gpm for 3 hours	0.54 MG
	Public Facilities	3,500 gpm for 4 hours	0.84 MG
	Mixed Use	3,500 gpm for 4 hours	0.84 MG
Commercial	4,000 gpm for 4 hours	0.96 MG	
Employment / Technology	4,000 gpm for 4 hours	0.96 MG	
3	Booster Pump Stations (See Section 6-5)	In open zones with two or more sources of supply, capable of delivering Maximum Day Demand	
		In closed zones, capable of delivering Maximum Day Demand plus Fire Flow Demand or Peak Hour Demand, whichever is greater	
		Stand-by pump equal in size to the largest duty pump	
		Flow meters, suction and discharge pressure gauges, and telemetry equipment for alarm and status notification at each station	
		Provisions for emergency power at all stations	

**Table 6-1 (Continued)
Performance Evaluation Criteria**

	Description	Criteria	Existing Requirement
4	Static Service Pressures (See Section 6-6)	Minimum 50 psi	
		Desired 60-80 psi	
		Maximum 120 psi	
5	Dynamic Service Pressures (See Section 6-6)	Minimum 40 psi during Maximum Day Demand	
6	Minimum Pipe Size (See Section 6-7)	8-inch, except on short cul-de-sac dead-end mains where 6-inch is allowed	
7	Maximum Velocities (See Section 6-7)	5 fps at Average Day Demand	
		7 fps at Maximum Day	
		10 fps at Fire Flow Demand	
8	Fire Flow Demands (See Section 6-8)		
	Low Density Residential	2,000 gpm for 2 hours with 20 psi residual pressure at fire hydrant	0.24 MG
	Medium Density Residential	2,000 gpm for 2 hours with 20 psi residual pressure at fire hydrant	0.24 MG
	High Density Residential	3,000 gpm for 3 hours with 20 psi residual pressure at fire hydrant	0.54 MG
	Public Facilities	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant	0.84 MG
	Mixed Use	3,500 gpm for 4 hours with 20 psi residual pressure at fire hydrant	0.84 MG
	Commercial	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant	0.96 MG
	Employment / Technology	4,000 gpm for 4 hours with 20 psi residual pressure at fire hydrant	0.96 MG

6-2 Source of Supply

Any potable water system should be capable of meeting all demands imposed upon it. This can be achieved through multiple supply sources, storage, or a combination of both. Generally, the determination is based upon supply availability, existing storage capacity, and cost. It is prudent to secure water supplies from multiple sources so that demands can be met at reasonable levels when one or more water sources are not available.

California Code of Regulations Related to Drinking Water require a minimum source of supply to meet the service area’s maximum day demand. Additionally, since the City serves more than 1,000 meters, the system must be capable of providing four hours of peak hourly demand through a combination of source capacity, storage capacity, and emergency source capacity.

The City’s water supply is a combination of local groundwater and imported water. Whenever possible, the City plans to supply the system with 100 percent groundwater in the future. Therefore, although imported water is available, it would be prudent for the source of supply criterion to be met solely by the City’s groundwater well capacity.

The criterion for source of supply is to provide one maximum day demand (MDD). Water from storage reservoirs will be utilized to regulate hourly fluctuations in demand (operational storage) and to provide fire flow demand (fire suppression storage). This allows the City the ability to operate their system independently in the event that the imported water service is disrupted for an extended period of time.

Imported water will be utilized to supplement the groundwater supply if multiple wells are out of operation for maintenance or in an emergency. It is highly unlikely that all the City's wells would be out of service at one time, but it is recommended that wells be equipped with permanent generators or portable generator connections. One maximum day demand (MDD) of imported water capacity is more than sufficient.

6-3 Storage

For a water system, three categories of storage are of importance: operational, emergency, and fire suppression. The system is evaluated to determine its ability to meet established storage criteria, anticipated to be met with reservoir capacity and groundwater supplies.

6-3.1 Operational Storage

Operational storage serves to equalize variations in sources of supply and demand over short periods of time (daily or weekly). Utilizing the daily demand hydrograph, the component of operational storage accounts for the difference in supply and demand.

The operational storage might typically be based on one maximum day demand if groundwater storage is not available.

The maximum day demand (MDD) is 6,593 gpm or 9.49 mgd. The peak hour demand (MDD) is 8,236 gpm or 11.86 mgd. The total well capacity, based on the most recent efficiency tests, is about 10,600 gpm. Without the largest capacity well (Well 15), the well capacity is about 8,200 gpm. Therefore, the well capacity consistently exceeds the system demands. Operational storage is not critical when the system is viewed as a whole but may be needed within individual zones. For the City of Monterey Park's system, the operational storage criteria are conservatively set at 30 percent of the maximum day demand.

6-3.2 Emergency Storage

Emergency storage is used in the event of an interruption in the primary water supply source. It is assumed that most outages can be mitigated within 7 days. Accordingly, many agencies that depend solely on imported water, utilize 7 average days of storage as their emergency storage criterion. It is reasonable to expect that groundwater sources will be available during an outage of the imported water supply. Therefore, the required emergency storage volumes may typically be reduced by an agency's groundwater supply capacity.

The City's emergency storage volume can be reduced by the actual production capacity of its wells. The only requirement would be that the facilities be capable of pumping the water needed during an emergency from the wells to the higher zones. Since the City's well capacity of about 10,600 gpm exceeds the existing average day demand (4,547 gpm), the emergency storage criteria is set to one average day demand.

Operational and fire storage shall be available for each individual zone while emergency storage shall be available system-wide. Again, the only requirement is that the facilities are capable of moving the water needed during an emergency, from the location of the storage to all other zones.

6-3.3 Fire Suppression Storage

Fire suppression storage, shown in Table 6-1, is the volume required to supply the service area with the required fire flows, which range from 2,000 gpm to 4,000 gpm for a duration of two (2) to four (4) hours. The greatest volume required for fire suppression storage is 0.96 MG. The volume of fire flow storage required for each zone is equal to the volume of water required for the largest fire flow requirement in that zone. See Section 6-8 for further explanation of the fire suppression criteria.

6-4 Wells

New wells should be designed in accordance with the Water Well Standards: State of California Bulletin 74-81 and Bulletin 74-90 (supplement to Bulletin 74-81) and their updates, the most-recent American Water Works Association (AWWA) standard A -100, State Water Resources Control Board, and sound engineering judgment.

The pumps should be placed low enough so that subsequent lowering should not be necessary. All well screens should be below the pump intake to preclude cascading of water into the well casing even with the lowest expected pumping water level. The casing diameter shall be at least 4 inches larger than the largest pump bowl/column pipe dimension, and maximum velocity shall not exceed 5 feet per second (fps). Total screen area should be sized to maintain a velocity of less than 0.1 fps at the maximum anticipated flow. Additionally, the casings diameters should be selected to allow lining the wells in the future without losing capacity. The use of higher-grade materials, such as stainless steel, should be considered to increase the useful life of all future wells.

The well design should include a 4-inch diameter camera tube extending to below the pump suction elevation, a sounding tube, a separate air line with a depth gauge and an air connection and depth to water transducer. Flow meters, high and low discharge pressure switches, pressure gauges and transducers, and telemetry equipment should be included to continuously monitor the wells. Permanent emergency generators with automatic transfer switches should be considered at each future well site. At minimum, new sites should include manual transfer switches and portable generator connections. Soft start bypass should be provided for each variable frequency drive so that a pump can be operated when its variable frequency drive (VFD) is out of service.

6-5 Booster Pump Stations

For open zones (zones with storage reservoirs) with two or more sources of supply and sufficient fire demand storage, the pump capacity into the zone must meet the maximum day demands for the zone itself and any other zones it provides water to. Well supply and imported water directly supplying the zone can be included in the pump capacity.

For open zones that do not have sufficient fire demand storage, the pump capacity into the zone must meet maximum day plus fire demands for the zone itself as well as any zones it provides water to. Well supply and imported water directly supplying the zone can be included in the pump capacity.

For closed zones (zones without storage reservoirs), the pump capacity into the zone must meet maximum day plus fire demands or peak hour demands, whichever is greater. A separate fire pump can be installed to meet the fire flow requirements.

Preliminary design reports (PDR) should be developed prior to the design and construction of a new pump station or an upgrade to a pump station. At a minimum, the PDR should address pump station location, system hydraulics, demands and pressures, pump selections, design criteria, equipment selection, construction issues, cost estimates, and scheduling. The pump station firm capacity, number of pumps, and type of pumps should also be evaluated and determined during the development of the PDR.

All future booster pump stations must incorporate a standby pump of the same size as the largest duty pump. This ensures that there is a replacement for the largest duty pump during maximum day demand conditions, while one of the pumps at the station is being repaired or replaced.

The pump stations should be equipped with modern pump controllers, flow meters, suction and discharge pressure gauges, high and low discharge pressure switches, low suction pressure switch, proper isolation valves, and telemetry equipment. Flow meters and pressure gauges are essential tools for monitoring pump performance and demand conditions in the service area. Telemetry equipment is used to remotely monitor the status of the facility and notify personnel in the event of a failure.

Pump stations should be constructed of fireproof materials and provided with peripheral sprinkler systems to prevent fire damage. Furthermore, power to the pump stations should be provided through underground service to minimize possibility of damage during fires. Pump stations with electric motors should be equipped with standby generators and automatic transfer switches to operate them during commercial power outages.

6-6 Service Pressures

Most water utilities set 60 to 80 pounds per square inch (psi) as the average static service pressure (at the lateral point of connection) throughout the system. The water system shall also be capable of maintaining a minimum residual service pressure of 40 psi during the peak hour demand. A residual pressure of 20 psi must be maintained at the fire hydrant outlet in developed areas during maximum day demand plus fire flow conditions (*CCR, 2017*). Note that it is possible to have pressures lower than the specified criteria if it is within a transmission main.

Static pressures should not exceed 80 psi, except where system operating conditions and geographical conditions warrant a higher pressure. In areas where pressures exceed 80 psi, the Uniform Plumbing Code requires customers to install “an approved type pressure regulator preceded by an adequate strainer” on their service connections to protect domestic plumbing and water heaters.

6-7 Transmission and Distribution System Pipelines

The distribution system shall be sized and designed to provide redundant service at adequate pressures for normal use as well as at fire flow conditions. In most cases, this can be accomplished by looping the system. Looping through easements or other areas which are not easily accessible shall be avoided. Provisions shall be made for supplying a service zone from at least two sources, where feasible.

In order to maintain adequate system pressures and prolong the life of the system pipes, flow velocities shall be limited. The system should operate at velocities of 1 to 3 feet per second (fps) normally, with a maximum velocity of 7 fps during intermittent peak flows. The pipe velocity during maximum day plus fire flow demands should not exceed 10 fps.

All new and replacement mains should be constructed with a minimum diameter of 8-inches, except

6-inch pipe can be used past the last fire hydrant at a dead-end. The existing pipes must be sized to provide adequate fire flows at the required hydrant outlet pressure of 20 psi while the maximum velocity criteria is not exceeded under maximum day plus fire flow demand conditions. These pipe size recommendations should be adhered to for all new design and construction projects, as well as any waterline replacement/upgrade projects.

6-8 Fire Suppression

The City of Monterey Park has adopted the California Fire Code, 2022 Edition per the Monterey Park, California Municipal Code Section 17.01.010. The fire flow requirements used for this study are therefore based upon the requirements of the California Fire Code (CCR, 2022), shown in Table 6-2 through Table 6-4. Requirements for residential buildings are shown in Table 6-2. Requirements for all other buildings are shown in Table 6-3. For small residential buildings with and without sprinklers, the fire flow requirement is only 500 gpm and 1,000 gpm, respectively. For larger residential buildings and other buildings, the fire flow requirements are shown in Table 6-4 and are based on the building construction methods and materials and building size. The requirement can be reduced if there is an automatic sprinkler system.

**Table 6-2
Required Fire Flow for One- and Two-Family Dwellings,
Group R-3 and R-4 Buildings and Townhouses**

Fire Flow Calculation Area (square feet)	Automatic Sprinkler System (Design Standard)	Minimum Fire Flow (gallons per minute)	Flow Duration (hours)
0 - 3,600	No automatic sprinkler system	1,000	1
3,601 and greater	No automatic sprinkler system	Value in Table 6-4	Duration in Table 6-4 at the required fire flow rate
0 - 3,600	Section 903.3.1.3 of the <i>California Fire Code</i> or Section 313.3 of the <i>California Residential Code</i>	500	1/2
3,601 and greater	Section 903.3.1.3 of the <i>California Fire Code</i> or Section 313.3 of the <i>California Residential Code</i>	1/2 value in Table 6-4	1

Reference: 2022 California Fire Code, Appendix B, Table B105.1(1)

**Table 6-3
Required Fire Flow for Buildings Other than One- and Two-Family Dwellings,
Group R-3 and R-4 Buildings and Townhouses**

Automatic Sprinkler System (Design Standard)	Minimum Fire Flow (gallons per minute)	Flow Duration (hours)
No automatic sprinkler system	Value in Table 6-4	Duration in Table 6-4
Section 903.3.1.3 of the <i>California Fire Code</i>	25% of the value in Table 6-4 ^a	Duration in Table 6-4 at the reduced flow rate
Section 903.3.1.3 of the <i>California Fire Code</i>	25% of the value in Table 6-4 ^b	Duration in Table 6-4 at the reduced flow rate

a. The reduced fire flow shall be not less than 1,000 gallons per minute

b. The reduced fire flow shall be not less than 1,500 gallons per minute

Reference: 2022 California Fire Code, Appendix B, Table B105.2

Table 6-4
Reference Table for Table 6-2 and Table 6-3

Fire Flow Calculation Area (sq. ft.)					Fire Flow (gpm) ^b	Flow Duration (hrs)
Type IA and IB ^a	Type IIA and IIIA ^a	Type IV and V-A ^a	Type IIB and IIIB ^a	Type V-B ^a		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
-	-	115,801-125,500	83,701-90,600	51,501-55,700	6,250	
-	-	125,501-135,500	90,601-97,900	55,701-60,200	6,500	
-	-	135,501-145,800	97,901-113,200	60,201-64,800	6,750	
-	-	145,801-156,700	106,801-113,200	64,801-69,600	7,000	
-	-	156,701-167,900	113,201-121,300	69,601-74,600	7,250	
-	-	167,901-179,400	121,301-129,600	74,601-79,800	7,500	
-	-	179,401-191,400	129,601-138,300	79,801-85,100	7,750	
-	-	191,401-Greater	138,301-Greater	85,101-Greater	8,000	

a. Types of construction are based on the *California Building Code*

Types I and II = noncombustible materials

Types III = exterior walls are noncombustible materials; interior elements are any material permitted by code

Types IV = exterior walls are noncombustible materials; interior elements are solid or laminated wood

Types V = any materials permitted by code

b. Measured at 20 psi at hydrant outlet

Reference: 2022 California Fire Code, Appendix B, Table B105.1(2)

For specific future development planning and design, the fire flow criteria should be adjusted on a case by case basis per the latest California Fire Code. As this Master Plan is a planning level document, an evaluation of whether California Fire Code requirements are met at each individual parcel was not performed. Instead, fire flow criteria was selected for each land use type and utilized for the evaluation of the water system. The fire flow criteria selected for the Master Plan is shown in Table 6-5. This criteria is considered conservative yet reasonable so that it will satisfy the requirements for the majority of the buildings. For analysis, the minimum required fire flow at each hydrant was based on the adjacent land use having the highest fire flow requirement.

**Table 6-5
Fire Flow and Fire Hydrant Location Criteria**

Land Use	Fire Flow (gpm)	Duration (hrs)	Residual Pressure at Hydrant Outlet (psi)	Average Spacing between Hydrants (ft)	Maximum Distance from any Point on Street or Road Frontage to a Hydrant (ft)
Low Density Residential	2,000	2	20	450	225
Medium Density Residential	2,000	2	20	450	225
High Density Residential	3,000	3	20	400	225
Public Facilities	3,500	4	20	350	210
Mixed Use	3,500	4	20	350	210
Commercial	4,000	4	20	350	210
Employment / Technology	4,000	4	20	350	210

Reference: 2022 California Fire Code, Appendix C, Table C102.1

6-9 Service Life of Facilities

All facilities have useful lives for which relatively trouble-free service can be expected. Once exceeded, these facilities become less reliable, expensive to maintain and are subject to failure. Therefore, facility age is considered in the assessment of all water systems and in formulating future replacement projects.

The determination of the useful life is dependent upon multiple considerations. Table 6-6 shows the useful lives that are generally accepted as prudent planning criteria. They shall be one of the considerations in determining the phasing of facility replacement

Well casings are estimated to have a useful life up to 60 years. As discussed in Section 5-6, there are five existing wells that are beyond its useful life or nearing the end of its useful life. It is recommended that the City plan for the replacement of these wells in the near term.

**Table 6-6
Planning Criteria for Facility Useful Life**

Facility	Useful Life (Years)
Steel Reservoirs	40
Steel Reservoir Coating and Lining	20
Concrete Reservoirs	50
Lined & Coated Ductile Iron/Steel Pipe	50
PVC Pipe	50
Asbestos Cement Pipe	50
Cast Iron and Steel Pipe (without lining or coating)	35
Pump Stations/Wells/Treatment Facilities	
Structure	50
Piping	40
Valves	20
Mechanical	15
Electrical	15
Well Casing	20 - 60

6-10 Operational Flexibility

Operational Flexibility is achieved by providing multiple sources of supply, back-up or stand-by facilities, and looped distribution system piping. Criteria to be applied include:

- Provide multiple sources of supply
- Provide looped system whenever possible
- Provide emergency interconnections with neighboring agencies.
- Provide standby generators at wells and pump stations

6-11 Distribution System Maintenance Program

Regular maintenance of a distribution system is an essential part of a properly operated water distribution system. Maintenance should include periodic cleaning and flushing of the system, servicing of valves and hydrants, conducting leak surveys, replacement and repairs, and disinfection of repaired sections. Each maintenance and repair activity should be documented. This work should be performed in accordance with the Title 22, Chapter 16 (California Waterworks Standards) and AWWA G200 Standards.

Flushing

Flushing is performed to remove any accumulated sediments or other impurities which have been deposited in the system pipes. It will also help to restore system capacity. Flushing is performed by causing a large volume of water to pass through a pipe section that has been isolated. Flushing valves or fire hydrants are opened to allow flow into the isolated pipeline and settled sediments are suspended. It is important that system flushing be performed systematically to remove the debris. The minimum flushing velocity should be 2.5 fps.

Servicing of Valves and Hydrants

Valves are often found inaccessible, inoperable, or closed and should therefore be tested and exercised regularly. In the event of a line break, it is important that valves operate properly so that the break can be isolated for repair. Records of repair should require a notation of the time at which valves are closed and reopened so that valves do not remain closed inadvertently.

Hydrants should be periodically inspected for leaks at the hose outlets. Leaking hydrants should be removed and/or reconditioned and then replaced.

Leak Surveys

Comparison of pumping and purchase records, and customer meter readings and other uses such as system flushing can indicate if excessive leakage is occurring in the system. Leak surveys should be conducted when excessive leakage is suspected.

Water Main Replacement and Repair

Water mains are repaired and/or replaced when pipes are found to be broken, corroded, or leaking. The method of repair should consider if the line is scheduled for replacement, its location in the system, and the conditions which led to the failure. Following the repair or replacement of any pipe, the line should be flushed and disinfected in accordance with the applicable requirements.

Storage Tank and Reservoir Maintenance

The storage tanks should be inspected periodically by a qualified diver at no more than 5-year intervals. The reports from diving inspections should be utilized in scheduling the subsequent inspection program, as well as the maintenance/repair projects.

SECTION 7

HYDRAULIC MODEL

7-1 General

A computer model of the City's water system was developed in the Innovyze InfowaterPro software platform. It was utilized to aid in the evaluation of the adequacy of the existing facilities under the current and future demand conditions.

Generally, the model development steps included the following:

1. Utilize the City's existing hydraulic model which was updated in 2012 as the basis for the model geometry
2. Update pipeline geometry through review of atlas sheets and discussions with engineering and operations staff
3. Verify and complete pipe information (pressure zone, diameter, length, roughness)
4. Verify and complete junction information (pressure zone, elevations)
5. Junctions were added to the mainlines to represent fire hydrant junctions based on a fire hydrant shapefile provided by the City and laterals drawn to the main lines.
6. Add detailed facility data (wells, pump stations, reservoirs, and imported water connections)
7. Add facility information (dimensions and water level for tanks, pump curves for booster pumps and wells, and aquifer levels for well pump suction levels)
8. Determine and assign demands to model junctions
9. Develop and assign diurnal demand curves to model junctions
10. Assign controls to facilities (pump start and stop conditions, imported water connection settings)

The model includes the potable water pipelines that are owned by the City. Water service laterals are not included. Modeling information associated with each pipe includes diameter, length, and roughness factor. Other pipe information included in the model database are year of installation, pressure zone, and pipe material. Modeling information associated with each junction includes ground elevation, water demand, and diurnal pattern of demand. Model junction elevations were obtained from publicly available 2015-2016 LARIAC Lidar DEM data for the Los Angeles Region.

7-2 Demand Distribution

7-2.1 Existing Demands

The City provided water billing data for 2021. The meter locations were plotted by service address and service laterals were created to connect the meter points to the mainline within the associated pressure zone. This enabled each water meter and its demand to be assigned to the closest model junction ID.

The existing demand distribution was based upon water meter data provided for January 2021 through December 2021. The demands were loaded onto model junctions and updated as part of the calibration process. The demands were then adjusted so that the total demand matched the existing water demand estimates (see Table 4-5) for all analysis scenarios (average day, maximum day, etc.). This method of distributing demands inherently accounted for any high water users within the existing service area as well as non-revenue water. The water demands are assigned to the following database fields within the model:

- Demand Type 1: Zone 1 Demands
- Demand Type 2: Zone 2, 2A(2), 2A(3), 2B(1), and 2B(2) Demands
- Demand Type 3: Zone 2A(1) Demands
- Demand Type 4: Zone 3 Demands
- Demand Type 5: Zone 4, 4A, and 4B Demands
- Demand Type 6: Zone 5 Demands
- Demand Type 7: Zone 5A Demands
- Demand Type 8: Not Used
- Demand Type 9: Not Used
- Demand Type 10: Not Used

7-2.2 Future Demands

The future demands were calculated individually for known planned future developments, based on land uses and water demand factors shown in Table 4-8. The calculated demands were then input manually into the model at appropriate model junctions.

7-3 Diurnal Curves

The developed diurnal demand curves discussed in Section 4-3.3 were specified at each node.

7-4 Model Scenarios

7-4.1 Model Scenarios and Datasets

The accuracy of the hydraulic model for the existing system was verified during the calibration process, as described in Section 8 of this report. Within the model software, new data sets and query sets were created to represent different operating conditions.

Data sets change as conditions in each scenario need to be changed. For example, separate demand sets were created to represent the various demand conditions. Separate control sets were created to define the initial status and controls of facilities. The data sets associated with each scenario are shown in Table 7-1.

**Table 7-1
Existing Model Scenarios and Data Sets**

Dataset	Calibration Scenario (CALIBRATION_7_28_22)	Existing Scenario			Future Scenario			
		Average Day Demand (EXISTING_ADD)	Maximum Day Demand (EXISTING_MDD)	Maximum Day Demand (EXISTING_MDD_MWD)	Average Day Demand (FUTURE_ADD)	Maximum Day Demand (FUTURE_MDD)	Maximum Day Demand + Fire Flow (Single Hydrant) (FUTURE_MDD_FF_SINGLE)	Maximum Day Demand + Fire Flow (Multi-Hydrant) (FUTURE_MDD_FF_MULTI)
Demand Set	7_28_22_CALIBRATION	EXISTING_ADD	EXISTING_MDD	EXISTING_MDD	FUTURE_ADD	FUTURE_MDD	FUTURE_MDD	FUTURE_MDD
Tank Set	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING	EXISTING
Reservoir Set	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE
Pump Set	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE
Valve Set	CALIBRATION_7_28_22_VALVE	ADD	MDD	MWD_VALVE	ADD	MDD	MDD	MDD
Pipe Set	CALIBRATION	BASE	BASE	BASE	BASE	BASE	BASE	BASE
Control Set	CALIBRATION_7_28_22	EXISTING_ADD	EXISTING_MDD	MWD_SUPPLY	FUTURE_ADD	FUTURE_MDD	EXISTING_MDD	FUTURE_MDD
Logical Set	BASE	BASE	BASE	BASE	BASE	BASE	BASE	BASE
Fireflow Set	BASE	BASE	BASE	BASE	BASE	SINGLE_FF	SINGLE_FF	MULTI_FF
Facility Set	CALIBRATION	EXISTING	EXISTING	EXISTING	FUTURE	FUTURE	EXISTING ¹	FUTURE ²

¹ Existing system geometry was used to run the global fire flows from each single hydrant

² Future system geometry was used to run the fire flows from multiple hydrant, as recommendations were being developed

The following scenarios were created:

1. Model Calibration Day Scenario (CALIBRATION_7_28_22)
2. Existing Average Day Demand Scenario (EXISTING_ADD)
3. Existing Maximum Day Demand Scenario (EXISTING_MDD)
4. Existing Maximum Day Demand Scenario Emergency Scenario (EXISTING_MDD_MWD)

This scenario was used to model the existing system with the total supply from the MWD connection. This would simulate a complete outage at the Delta Booster Pump Station, outage of the treatment plants, and/or restrictions to the use of groundwater from the wells

5. Future Average Day Demand Scenario (FUT_ADD)
6. Future Maximum Day Demand Scenario (FUT_MDD)

This scenario is used to run the global fire flow analysis at all model hydrants. It assumes that the full fire flow demand is drawn from a single hydrant.

7. Future Maximum Day Fire flow using multiple hydrants (FUT_MDD_MULTI_FF)

This scenario was used for running fire flow analysis at multiple fire hydrants at the same time in select areas where the analysis didn't meet the fire criteria using just one hydrant.

The aforementioned scenarios were used to evaluate system performance with respect to pressures, pipe velocities, and fire flow availability. The system analysis and results are described in Section 9

7-4.2 Model Facility Datasets

Facility sets are essentially a query set made up of the DB queries listed in Table 7-2

The existing facility set includes the existing facilities. The future facility set includes all existing and proposed facilities.

**Table 7-2
Model Facility Sets**

	Element Type	DB Query Name	Query Statement
EXISTING FACILITY SET	Junction	EXISTING_JUNCTION	Status = EXISTING
		REMOVE_EXISTING_JUNC ¹	Status = REM_EXI
	Tanks	EXISTING_TANK	Status = EXISTING
		REMOVE_EXISTING_TANK	Status = REM_EXI
	Reservoir	EXISTING_RESERVOIR	Status = EXISTING
	Pumps	EXISTING_PUMP	Status = EXISTING
		REMOVE_EXISTING_PUMP ¹	Status = REM_CAL
	Pipes	EXISTING_PIPE	Status = EXISTING
		REMOVE_EXISTING_PIPE ¹	Status = REM_EXI
	Valves	EXISTING_VALVE	Status = EXISTING
		REMOVE_EXISTING_VAL ¹	Status = REM_EXI

¹ Represents existing facilities that are recommended for improvement in the future scenarios

**Table 7-2 (Continued)
Model Facility Sets**

FUTURE FACILITY SET	Element Type	DB Query Name	Query Statement
	Junction	EXISTING_JUNCTION	Status = EXISTING
		FUTURE_JUNCTION	Status = FUTURE
	Tanks	EXISTING_TANK	Status = EXISTING
	Reservoir	EXISTING_RESERVOIR	Status = EXISTING
	Pumps	EXISTING_PUMP	Status = EXISTING
		FUTURE_PUMP	Status = FUTURE
	Pipes	EXISTING_PIPE	Status = EXISTING
		FUTURE_PIPE	Status = FUTURE
	Valves	EXISTING_VALVE	Status = EXISTING
FUTURE_VALVE		Status = FUTURE	

7-5 Facility Model Characteristics and Control Settings

7-5.1 Storage Reservoirs

All active storage reservoirs are included in the hydraulic model. The reservoirs are designated as “tanks” because they have a known finite volume and water surface levels that change with time as water flows into or out of them. (Note the model software defines “reservoirs” as sources of water that remain at a constant water level irrespective of the flow. They have an unlimited volume and are generally used to represent a lake or other inexhaustible supply source.)

The storage reservoir characteristics input in the model are shown in Table 7-3.

7-5.2 Wells

The City’s water system currently has eight (8) active wells. The normal operation control settings of the wells for the average day demand (ADD) and maximum day demand (MDD) model scenarios are shown in Table 7-4.

The Delta settling tanks are the model boundary conditions. The well pumps, treatment facilities, and collection lines were not included in the model. Model flow control valves were used to control the well supplies, per the City’s typical operations.

7-5.3 Booster Pump Stations

The booster pump station control settings are shown in Table 7-5. These controls were developed by reviewing SCADA data, as well as interviews with City operations staff. The same controls settings are used for average day and maximum day demand scenarios.

**Table 7-3
Storage Reservoir Characteristics**

Pressure Zone	Reservoir Name	New Model ID	Bottom Elevation (ft)	Model Tank Type	Model Tank Diameter (ft)	Model Tank Minimum Level (ft)	Model Tank Maximum Level (ft)	Existing and Future Conditions Initial Tank Level (ft)
1 & 2	Delta 2	DELTA_RES_2	260.0	0: Cylindrical	60	0	8	6.54
1 & 2	Delta 3	DELTA_RES_3	260.0	0: Cylindrical	60	0	8	6.54
1	La Loma 5	LA_LOMA_RES_5	440.0	0: Cylindrical	120	5	25	20.66
1	La Loma 5A	LA_LOMA_RES_5A	439.6	0: Cylindrical	120	5	26	20.74
2	Russell 1A	RUSSELL_RES_1A	544.5	0: Cylindrical	146	5	23	21.48
2	Russell 2A	RUSSELL_RES_2A	544.5	0: Cylindrical	146	5	23	21.48
2	Bradshawe 3	BRADSHAWE_RES_3	543.16	0: Cylindrical	90	5	24	18.96
2	Bradshawe 3A	BRADSHAWE_RES_3A	544.3	0: Cylindrical	92	5	23	18.69
2	Pinetree 8	PINETREE_RES_8	544.0	0: Cylindrical	120	5	23	17.76
3	Highland 6	HIGHLAND_RES_6	615.0	0: Cylindrical	90	5	23	17.83
3	Highland 6A	HIGHLAND_RES_6A	615.0	0: Cylindrical	90	5	24	18.43
4	Sequoia 4A	SEQUOIA_RES_4A	660.9	0: Cylindrical	90.5	5	31.1	24.74
5	Sombrero 7	SOMBRERO_RES_7	702.5	0: Cylindrical	92	5	33.2	25.62
2A(1)	Ackley Hydropneumatic	ACKLEY_HYDROPNEUMATIC_TANK	454.6	0: Cylindrical	5	0	250	185
2A(2)	Russell Hydropneumatic	RUSSELL_HYDROPNEUMATIC_TANK	555.4	0: Cylindrical	5	0	150	126.87
2A(3)	Bradshawe Hydropneumatic	BRADSHAWE_HYDROPNEUMATIC_TANK	541.6	0: Cylindrical	5	0	150	138.48

**Table 7-4
Well Pump Control Settings**

Well ID	Model Valve ID	Model Reservoir ID	Average Day Demand Settings (Existing and Future)				
			Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Setting (gpm)
1	WELL_1_GW_VALVE	WELL_1_GW	Off	N.A.	N.A.	N.A.	N.A.
3	WELL_3_GW_VALVE	WELL_3_GW	Off	N.A.	N.A.	N.A.	N.A.
5	WELL_5_GW_VALVE	WELL_5_GW		Russell Reservoir	below	18	800
					above	21	0 (Closed)
9	WELL_9_GW_VALVE	WELL_9_GW	Off	N.A.	N.A.	N.A.	N.A.
10	WELL_10_GW_VALVE	WELL_10_GW	Off	N.A.	N.A.	N.A.	N.A.
					N.A.	N.A.	N.A.
Fern	WELL_FERN_GW_VALVE	WELL_FERN_GW	Off	N.A.	N.A.	N.A.	N.A.
12	WELL_12_GW_VALVE	WELL_12_GW	On	N.A.	N.A.	N.A.	1700
15	WELL_15_GW_VALVE	WELL_15_GW	On	N.A.	N.A.	N.A.	1800

Well ID	Model Valve ID	Model Reservoir ID	Maximum Day Demand Settings (Existing and Future)				
			Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Setting (gpm)
1	WELL_1_GW_VALVE	WELL_1_GW	Off	N.A.	N.A.	N.A.	N.A.
3	WELL_3_GW_VALVE	WELL_3_GW	Off	N.A.	N.A.	N.A.	N.A.
5	WELL_5_GW_VALVE	WELL_5_GW	On	N.A.	N.A.	N.A.	800
9	WELL_9_GW_VALVE	WELL_9_GW	Off	N.A.	N.A.	N.A.	N.A.
10	WELL_10_GW_VALVE	WELL_10_GW		Russell Reservoir	below	18	1300
					above	21	0 (Closed)
Fern	WELL_FERN_GW_VALVE	WELL_FERN_GW	Off	N.A.	N.A.	N.A.	N.A.
12	WELL_12_GW_VALVE	WELL_12_GW	On	N.A.	N.A.	N.A.	1700
15	WELL_15_GW_VALVE	WELL_15_GW	On	N.A.	N.A.	N.A.	1800

**Table 7-5
Booster Pump Station Sequencing Controls**

Name	Pump No.	Model Pump ID	Discharge Zone	Existing Controls						Future Controls							
				Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Model Action	VFD Setting (psi)	Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Model Action	VFD Setting (psi)		
Delta	1	DELTA_PUMP_1	2	On	Delta Forebay Reservoir	Above	6.50	On	N.A.	On	Delta Forebay Reservoir	Above	6.50	On	N.A.		
					Below	5.00	Off	N.A.					Below	5.00	Off	N.A.	
	2	DELTA_PUMP_2		On	Delta Forebay Reservoir	Above	6.75	On	N.A.	On	Delta Forebay Reservoir	Above	6.75	On	N.A.		
			Below		5.25	Off	N.A.					Below	5.25	Off	N.A.		
	3	DELTA_PUMP_3	Off	Delta Forebay Reservoir	Above	7.00	On	N.A.	Off	Delta Forebay Reservoir	Above	7.00	On	N.A.			
				Below	5.50	Off	N.A.					Below	5.50	Off	N.A.		
4	DELTA_PUMP_4		Off	Backup						Off	Backup						
5	DELTA_PUMP_5	1	Off	La Loma Res Level	Below	19.00	On	N.A.	Off	La Loma Res Level	Below	19.00	On	N.A.			
				Above	22.00	Off	N.A.					Above	22.00	Off	N.A.		
	6	DELTA_PUMP_6		Off	Backup						Off	Backup					
La Loma	1	LA_LOMA_PUMP_1	2	Off	Backup						Off	Backup					
	2	LA_LOMA_PUMP_2		Off	Backup						Off	Backup					
	3	LA_LOMA_PUMP_3		Off	Backup						Off	Backup					
Country	1	COUNTY_PUMP_1	2A(1)	Off					60	Existing pump not modeled in future							
	2	COUNTY_PUMP_2		Off	Backup						Existing pump not modeled in future						
	Future	COUNTRY_FUTURE_PUMP_1		Future						On					60		
	Future	COUNTRY_FUTURE_PUMP_1		Future						Off	Backup						
Ackley ¹	1	ACKLEY_PUMP_1	2A(1)	On	Ackley Hydropneumatic	Below	150.18	On	N.A.	Existing pump not modeled in future							
					Above	184.84	Off	N.A.	Existing pump not modeled in future								
	2	ACKLEY_PUMP_2		Off	Ackley Hydropneumatic	Below	173.29	On	N.A.	Existing pump not modeled in future							
					Above	207.95	Off	N.A.	Existing pump not modeled in future								
3	ACKLEY_PUMP_3	Off	Ackley Hydropneumatic	Below	161.74	On	N.A.	Existing pump not modeled in future									
			Above	196.39	Off	N.A.	Existing pump not modeled in future										
Future	ACKLEY_FUTURE_PUMP	Future						On					80				
Russell ¹	1	RUSSELL_PUMP_1	2A(2)	On	Russell Hydropneumatic	Below	103.97	On	N.A.	Existing pump not modeled in future							
					Above	127.08	Off	N.A.	Existing pump not modeled in future								
	2	RUSSELL_PUMP_2		Off	Russell Hydropneumatic	Below	92.42	On	N.A.	Existing pump not modeled in future							
		Above	115.53		Off	N.A.	Existing pump not modeled in future										
Future	RUSSELL_FUTURE_PUMP	Future											55				
Bradshawe ¹	1	BRADSHAWE_PUMP_1	2A(3)	On	Bradshawe Hydropneumatic	Below	115.53		N.A.	Existing pump not modeled in future							
					Above	138.63		N.A.	Existing pump not modeled in future								
	2	BRADSHAWE_PUMP_2		Off	Bradshawe Hydropneumatic	Below	103.97	On	N.A.	Existing pump not modeled in future							
		Above	127.08		Off	N.A.	Existing pump not modeled in future										
Future	BRADSHAWE_FUTURE_PUMP	Future											60				

Table 7-5 (Continued)
Booster Pump Station Sequencing Controls

Name	Pump No.	Model Pump ID	Discharge Zone	Existing Controls						Future Controls							
				Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Model Action	VFD Setting (psi)	Initial Status	Reference Reservoir	If Reference Reservoir is	Level (ft)	Model Action	VFD Setting (psi)		
Brightwood	1	BRIGHTWOOD_PUMP_1		Off	Highland Res 6	Below	17.00	On	N.A.	Off	Highland Res 6	Below	17.00	On	N.A.		
		Above				20.00	Off	N.A.				Above	20.00	Off	N.A.		
	2	BRIGHTWOOD_PUMP_2		Off	Backup						Off	Backup					
Kingsford	1	KINGSFORD_PUMP_1	4	Off	Sequoia	Below	24.00	On	N.A.	Off	Sequoia	Below	24.00	On	N.A.		
		Above				28.00	Off	N.A.				Above	28.00	Off	N.A.		
	2	KINGSFORD_PUMP_2		Off	Backup						Off	Backup					
Sequoia	1	SEQUOIA_PUMP_1	4A	Off					70	Existing pump not modeled in future							
	2	SEQUOIA_PUMP_2		Off	Backup						Existing pump not modeled in future						
	3	SEQUOIA_PUMP_3		Off	Backup						Existing pump not modeled in future						
	Future	SEQUOIA_PUMP1_FUTURE		Future												70	
Vagabond	1	VAGABOND_PUMP_1	5	Off	Sombrero Reservoir	Below	24.00	On	N.A.	Off	Sombrero Reservoir	Below	24.00	On	N.A.		
		Above				28.00	Off	N.A.				Above	28.00	Off	N.A.		
	2	VAGABOND_PUMP_2		Off	Backup						Off	Backup					
	3	VAGABOND_PUMP_3		Off	Backup						Off	Backup					
Sombrero	1	SOMBRERO_PUMP_1	5A	Off					50	Off					50		
	2	SOMBRERO_PUMP_2		Off	Backup						Off	Backup					

¹ Pump settings hold pressures (converted to feet) in the hydropneumatic tanks

7-5.4 Imported Water Connections

Imported water connections were inputted in the model, but do not provide supply in any scenarios. The connections may be used during emergency operations. The imported water connection model data is shown in table 7-6.

**Table 7-6
Imported Water Connection Controls**

Agency	Location	To Zone	Capacity (gpm)	Model Reservoir ID	Model Valve ID	Model Status
San Gabriel Valley Water Company	Vicinity of City's Well No. 7. 8830 e Fern Asve. Rosemead	Delta Tanks	4000	SGVWC_RES	SGVWC_VALVE	Closed
Metropolitan Water District	Moore Avenue, north of Newmark Avenue	2	7000	MWD_RES	MWD_VALVE	Closed
City of Montebello	Intersection of Wilcox Avenue and Pomona Boulevard	1	1000	CO_MTB_RES	CO_MTB_VALVE	Closed
California Water Service Company	Ameron Way at Sheriffs Academy in northwest portion of the system	2	1000	CWSC_RES	CWSC_VALVE	Closed
Golden State Water Company	Intersection of Garvey Avenue and Jackson Avenue	2	1000	GSWC_RES	GSWC_VALVE	Closed

7-6 Friction Factors

The pipeline friction factors used in the hydraulic model are shown in Table 7-7. Other factors that affect the pipe roughness coefficient include the number of connections to the pipe, the quality of construction, and the number of bends and tees. A direct correlation between pipe age and material has not clearly been defined at the time of this study. It has often been found that the pipe roughness coefficient depends heavily on the corrosiveness of the water conveyed and pipe velocities.

**Table 7-7
Pipe Roughness Coefficients**

Pipe Diameter	Pipe Roughness Coefficient
4-inch	90
6-inch	100
8-12 inch	120
14-16 inch	130
18-20 inch	140
24-36 inch	150

SECTION 8

MODEL CALIBRATION

8-1 General

The existing water system model was calibrated to verify the accuracy of the model, system configuration, and the hydraulic parameters utilized. The general calibration methodology was to gather as much system information as possible from available SCADA system data and pressure measuring equipment temporarily installed in the field. This information was then used for input into the model as well as comparison of model and field results. Typical indicators of an accurate model include the following:

- Reservoir level differences of 1 foot or less
- Hydraulic Grade Elevation (HGE) of 10 feet (4.3 psi) or less, per AWWA M32 recommendations.

8-2 Supervisory Control and Data Acquisition (SCADA) Data

Supervisory Control and Data Acquisition (SCADA) information was collected from July 16, 2022 through July 30, 2022 and used in calibrating the 24-hour extended period simulation. The following data was provided in 5 minute intervals.

- Reservoirs - water levels
- Booster Pumps –flows, status (On/ Off), suction and discharge pressures

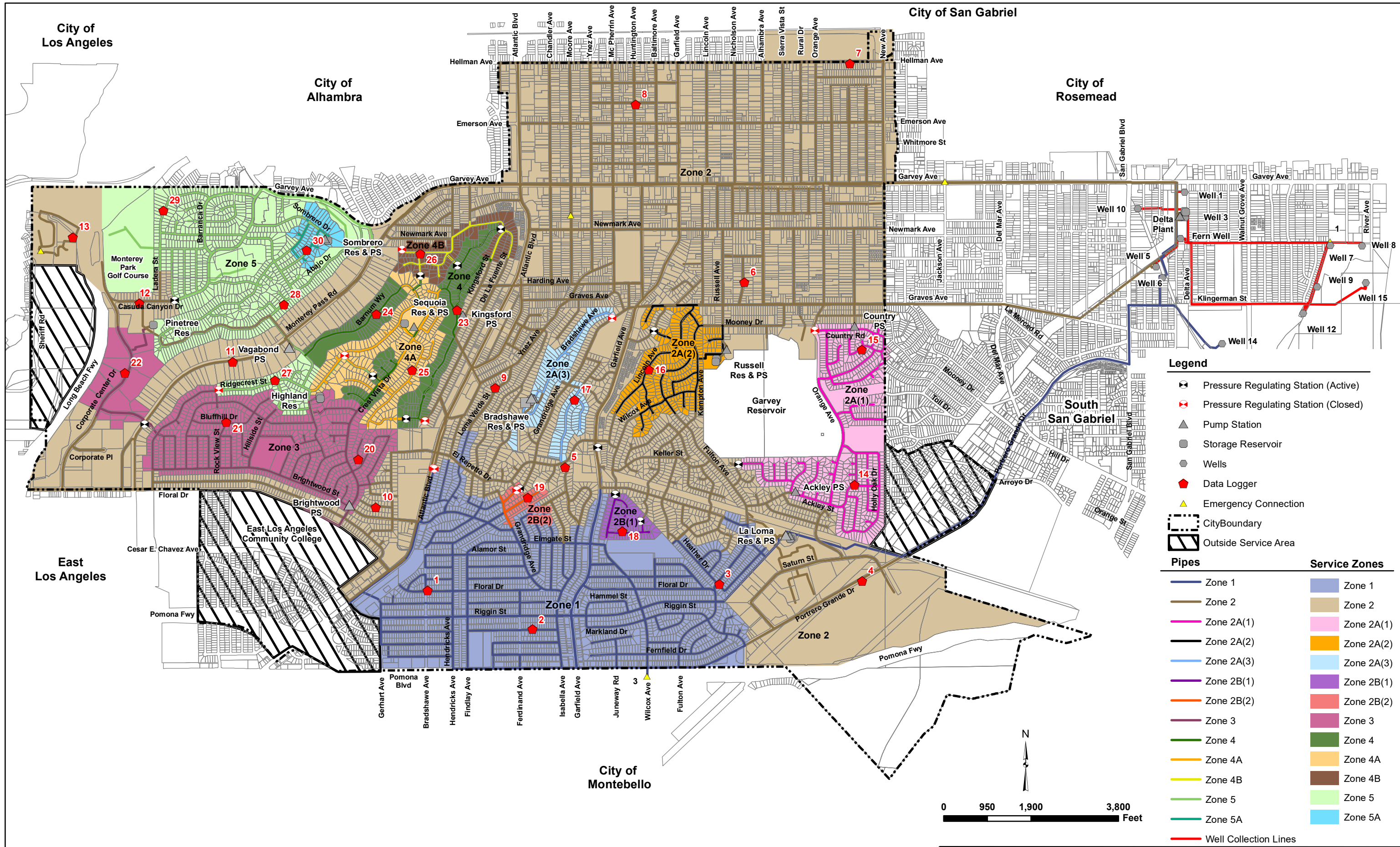
SCADA pump flow data is not available at Brightwood Booster Pump Station, Kingsford Booster Pump Station, Ackley Booster Pump Station, Russell Booster Pump Station, and Bradshawe Booster Pump Station. The SCADA pump status and the pump capacity from the current SCE efficiency tests were used to calibrate the model.

8-3 Field Collected Data

In addition to the data available via the SCADA system, pressure data was collected in the field by installing pressure data loggers on thirty (30) fire hydrants during the calibration period. The selected locations were scattered throughout the service area, as shown on Figure 8-1, in order to obtain representative pressure measurements in each pressure zone.

8-4 Calibration Period

The calibration period, the time period in which SCADA data and pressure data was collected in the field, was from July 16, 2022 to July 30, 2022. A 24-hour period was selected to represent normal demand and operating conditions during the calibration period. “Normal conditions” means that there were no noticeable anomalies and/or significant variation in the flows and pressures that could indicate an unusual event such as a fire or a main break. The calibration day was selected to be July 28, 2022.

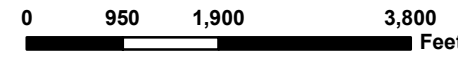


Legend

- Pressure Regulating Station (Active)
- Pressure Regulating Station (Closed)
- Pump Station
- Storage Reservoir
- Wells
- Data Logger
- Emergency Connection
- City Boundary
- Outside Service Area

Pipes	Service Zones
Zone 1	Zone 1
Zone 2	Zone 2
Zone 2A(1)	Zone 2A(1)
Zone 2A(2)	Zone 2A(2)
Zone 2A(3)	Zone 2A(3)
Zone 2B(1)	Zone 2B(1)
Zone 2B(2)	Zone 2B(2)
Zone 3	Zone 3
Zone 4	Zone 4
Zone 4A	Zone 4A
Zone 4B	Zone 4B
Zone 5	Zone 5
Zone 5A	Zone 5A

Well Collection Lines



AKM
 PROJECT NO: 0071775.00
 DATE: September 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

Pressure Data Logger Locations

Figure 8-1

8-5 Demand Allocation

Demand allocation for the calibration scenario was based on the average distribution represented by the water billing data during the period January 2021 through December 2021. The demands were globally adjusted within each hydraulic zone, to match the mass balance of SCADA flow data (flow in – flow out +/- water from the reservoirs) during the calibration period.

8-6 Zonal Diurnal Curves

Hourly water usage for each zone was determined based upon data collected from the City's SCADA system during the calibration period. The flow from the booster pump stations and water levels in the reservoirs were utilized in calculating the total amount of water used in each zone in 5-minute increments. The zonal diurnal demand curves are shown on Figure 4-3. It should be noted that the first time step represents 12 am midnight.

8-8 Imported Water Connections

Imported water connections were not utilized during the calibration period, therefore remained off in the calibration model simulation.

8-9 Booster Pump Stations

Booster pumps were given specified on/off times in the model and utilized the adjusted pump curves to determine the flows. The pump station flows for the calibration period are shown in Appendix 8-1.

8-10 Reservoirs

The initial reservoir levels were set to match those of the initial calibration period (July 22, 2022). The reservoir levels for the calibration period are shown in Appendix 8-2. The comparison of SCADA data versus model data is shown on each figure. Most reservoir levels were within 1 foot throughout the calibration period which is evidence of a well calibrated model.

8-11 Zone 2 Inoperable Valve

The City's operations staff identified an inoperable isolation valve at the intersection of Grandridge Avenue and Garfield Avenue in Zone 2. The valve is located on an 18-inch pipe and the existing valve position is unknown. If the operations staff wants to close this valve for isolation purposes, they have to instead utilize multiple nearby valves.

Operations staff report that the water levels in Bradshawe and Pinetree Reservoirs are typically lower than in Russell Reservoir. It seems to be difficult for water to flow to the west side of Zone 2. This may be due in part to the known inoperable valve and possibly other partially closed valves.

The known inoperable valve was modeled in the Calibration Scenario by creating system losses to represent what is believed to be a partially closed valve and the losses associated with it. Zone 2 was deemed calibrated when the model reservoir levels matched closely with the actual field collected data.

For the analysis scenarios, it is assumed that the inoperable valve will be replaced, so that there is no blockage of flow in the Zone 2 system.

8-12 System Pressures

The comparison of field collected data to model data at each of the pressure data logger (PDL) locations is shown in Table 8-1. The pressure data comparison graphs are shown in Appendix 8-3.

The average pressure difference was less than the required 4.3 psi (HGE = 10 ft) for all hydrants except for PDL Sites 17 and 26. Potential factors that may contribute to the differences between the model data and the field data include: closed or partially closed valves, inaccurate model node elevations versus actual field elevations, unknown condition of existing pipes, settings at pressure reducing valves, and inaccuracies in the pressure data loggers. The pressure differences are considered relatively minor and therefore, the hydraulic model was determined to be well calibrated.

**Table 8-1
Pressure Data Comparison**

PDL Site Number	Zone	Atlas Map No.	FH #	Fire Hydrant Location	Model Junction ID	Source	Minimum Pressure (psi)	Maximum Pressure (psi)	Average Pressure (psi)	Average Pressure Difference (psi)	% Difference	Comments
1	1	F8	83	Floral Dr east of Bradshaw Ave	J-1378	Field Data	75.10	82.10	79.15	-1.0	1.2%	
						Model Data	78.65	81.12	80.13			
2	1	G9	65	Markland Dr west of Isabella Ave	J-1597	Field Data	59.10	65.40	62.60	-1.0	1.5%	
						Model Data	62.14	64.53	63.57			
3	1	H8	55	Heather Dr southeast of Fulton Ave	J-1724	Field Data	65.50	67.60	66.50	-0.6	1.0%	
						Model Data	66.71	67.67	67.14			
4	2	I8	100	Portero Grand Dr southwest of Saturn St	J-1934	Field Data	77.10	97.20	88.14	-1.6	1.8%	
						Model Data	87.64	90.73	89.77			
5	2	G7	60	Isabella Ave south of El Repetto Dr	J-1552	Field Data	53.80	57.30	55.31	-0.4	0.7%	
						Model Data	55.02	56.56	55.70			
6	2	H5	71	Everett Ave north of Graves Ave	J-1843	Field Data	57.40	67.50	64.29	0.0	0.0%	
						Model Data	62.62	65.04	64.26			
7	2	I2	85	Hellman Ave east of Orange Ave	J-1959	Field Data	68.20	85.60	82.72	-0.2	0.3%	
						Model Data	80.97	83.93	82.96			
8	2	G3	78	Hilliard Ave east of Huntington Ave	J-1778	Field Data	67.50	73.00	70.77	-0.7	0.9%	
						Model Data	70.20	72.35	71.43			
9	2	G6	105	Loma Verde south of Ynez Ave	J-1639	Field Data	96.80	101.00	99.16	-0.5	0.5%	
						Model Data	98.70	100.62	99.63			
10	2	F7	85	Moonbeam Dr west of Sunrise Dr	J-1425	Field Data	75.50	79.80	78.07	-0.1	0.1%	
						Model Data	76.82	79.20	78.15			
11	2	E5	75	Monterey Pass Rd southwest of Vegabond Rd	J-1158	Field Data	67.80	71.10	69.51	-1.0	1.4%	
						Model Data	69.93	70.76	70.47			
12	2	D5	72	Casuuda Cyn Dr east of Corporate Center Dr	J-1016	Field Data	70.70	74.60	72.75	-0.7	1.0%	
						Model Data	72.93	73.72	73.48			
13	2	D4	NA	Centre Plaza Dr	J-1040	Field Data	54.80	64.90	59.61	-1.6	2.6%	
						Model Data	60.64	61.44	61.19			
14	2A(1)	I7	59	Ackley St west of Laurel Dr	J-1897	Field Data	43.10	68.60	61.62	-2.4	3.7%	Hydropneumatic System
						Model Data	58.12	72.63	63.99			
15	2A(1)	I5	63	Village Dr southwest of Village Pl	J-1993	Field Data	36.60	62.80	56.80	-2.7	4.5%	Hydropneumatic System
						Model Data	53.48	68.01	59.46			
16	2A(2)	H6	55	Lincoln Ave north of Langley Wy	J-1669	Field Data	40.60	85.30	53.59	-1.8	3.3%	Hydropneumatic System
						Model Data	50.38	60.35	55.40			
17	2A(3)	G6	82	Isabella Ave south of Pelon Wy	J-1512	Field Data	70.20	82.70	76.59	-4.4	5.4%	Hydropneumatic System
						Model Data	75.79	85.81	80.98			
18	2B(1)	G7	47	Oakgate St north of Aldergate St	J-1542	Field Data	65.10	68.20	66.57	1.0	-1.5%	Source of water via PRS
						Model Data	65.42	65.73	65.57			
19	2B(2)	G7	85	McPherrin Ave northeast of Pavo Real Ave	J-1534	Field Data	45.70	45.70	45.70	-2.6	5.3%	Source of water via PRS
						Model Data	48.26	48.26	48.26			
20	3	F7	95	McPherrin Ave northeast of Pavo Real Ave	J-1327	Field Data	85.40	91.50	88.10	-2.0	2.2%	
						Model Data	88.65	92.93	90.06			

**Table 8-1 (Continued)
Pressure Data Comparison**

PDL Site Number	Zone	Atlas Map No.	FH #	Fire Hydrant Location	Model Junction ID	Source	Minimum Pressure (psi)	Maximum Pressure (psi)	Average Pressure (psi)	Average Pressure Difference (psi)	% Difference	Comments
21	3	E6	68	Bluffhill Dr east of Rock View St	J-1173	Field Data	53.20	68.80	64.91	-0.9	1.4%	
						Model Data	64.66	67.78	65.84			
22	3	D6	21	Corporate Center Dr north of Davidson Dr	J-1056	Field Data	51.00	59.50	55.41	-0.9	1.5%	
						Model Data	55.02	58.27	56.27			
23	4	F5	80	Cadiz St south of Hermosa Vista St	J-1287	Field Data	67.10	74.30	70.37	-1.3	1.9%	
						Model Data	69.04	75.43	71.70			
24	4	F5	46	Barnum Wy	J-1262	Field Data	49.30	52.10	50.80	0.1	-0.1%	
						Model Data	49.64	51.81	50.74			
25	4A	F6	85	Ridgeside Dr south of Via Venti	J-1301	Field Data	72.20	79.20	75.99	1.1	-1.5%	
						Model Data	74.77	74.91	74.87			
26	4B	F4	74	Branham St east of Tedford Wy	J-1256	Field Data	63.50	78.60	74.63	-6.7	8.3%	Source of water via PRS
						Model Data	81.29	81.40	81.37			
27	5	E6	72	Ridgecrest St west of Hillside St	J-1164	Field Data	62.60	69.30	66.72	0.4	-0.7%	
						Model Data	64.63	67.93	66.27			
28	5	E5	97	Abajo Dr southwest of Arboles St	J-1144	Field Data	89.40	93.60	91.40	-0.9	1.0%	
						Model Data	91.09	93.61	92.32			
29	5	D4	94	Landera St north of Verde Vista Dr	J-1000	Field Data	84.50	88.30	86.35	0.0	0.0%	
						Model Data	85.46	87.36	86.36			
30	5A	E4	35	Avion Dr southwest of Aliso St	J-1227	Field Data	32.00	35.10	33.48	-0.5	1.5%	
						Model Data	32.97	35.13	34.00			
Total Average % Difference										1.3	1.9%	

SECTION 9

SYSTEM HYDRAULIC ANALYSIS

9-1 General

The established system criteria and hydraulic model were utilized to analyze the City's water system and evaluate its adequacy. The existing system was analyzed under average day demand, maximum day demand, peak hour demand, and maximum day demand plus fire flow conditions. Analyses of the City's source of supply, storage, and pumping facilities were also conducted.

Existing system deficiencies were identified, and mitigation projects were formulated based upon the results of the hydraulic analysis and discussions with City staff. Proposed projects were added in the hydraulic model to test the operation of the system after implementation.

The hydraulic improvement project locations are shown on Plate A. Details of the recommended projects and cost estimates are discussed in Section 11 of this Master Plan Report.

9-2 Source of Supply

The criterion established requires a source of supply equal to one maximum day demand or 6,593 gpm. The City's groundwater supply and imported water supply are summarized on Tables 9-1 and 9-2, respectively. The City relies primarily on its groundwater supply and has an active well pumping capacity of about 10,634 gpm. The total well capacity with the largest well (Well No. 15) out of service is 8,199 gpm. Therefore, the City's source of supply exceeds the required supply of 6,593 gpm and is adequate for providing maximum day demands to the system.

**Table 9-1
Groundwater Supply**

Well ID	Design Capacity (gpm)	Edison Test Date	Edison Test Capacity (gpm)
1	900	11/6/19	574
3	600	11/6/19	745
5	2,000	11/13/19	775
9	1,800	10/16/19	1,758
10	1,800	10/9/19	1,332
Fern	1,000	11/6/19	965
12	2,500	11/9/19	2,050
15	2,500	10/16/19	2,435
Total	13,100		10,634
Firm Capacity¹	10,600		8,199

¹ Firm Capacity is the total well capacity with the largest well out of service.

The imported water connections have a total capacity of 14,000 gpm and a firm capacity of 7,000 gpm, as shown in Table 9-2, which exceeds the source of supply requirement. These connections can be used during emergency events.

**Table 9-2
Imported Water Connection Capacities**

Agency	Capacity (gpm)
San Gabriel Valley Water Company (SGVWC)	4,000
Metropolitan Water District (MWD)	7,000
City of Montebello	1,000
California Water Service Company (CWSC)	1,000
Golden State Water Company (GSWC)	1,000
Total Capacity	14,000
Firm Capacity¹	7,000

¹ Firm Capacity is the total imported capacity with the largest connection out of service.

In a multi-zone system like the City's, the available supply must be delivered to all the zones with pump stations and/or pressure reducing stations at proper capacities (see Section 9-4).

9-3 Storage

9-3.1 Operational Storage

The operational storage criterion is set as 30% of maximum day demand for each zone. Maximum day demand is equivalent to 1.45 times the average day demand.

9-3.2 Emergency Storage

The emergency storage criterion is set at one average day demand. For a system that depends heavily on groundwater supplies, this amount of emergency storage is adequate and is primarily for response in operations due to loss of a major source of supply. The only requirement would be that the system facilities be capable of pumping the water needed during an emergency to the higher zones.

9-3.3 Fire Suppression Storage

Fire suppression storage is the volume required to supply the service area with the required fire flows, which range from 2,000 to 4,000 gpm for a duration of two (2) to four (4) hours.

9-3.4 Storage Analysis by Zone

The existing storage capacity and the calculated reservoir capacity needed for each zone is shown in Table 9-3. The total storage required is calculated by increasing the nominal storage by 15 percent so that a portion of the reservoir volume is available for variations in elevation and to provide submergence over the reservoir outlet pipe. In an emergency, the emergency storage volume, as well as the operational storage volume and the fire suppression storage volume would all be available for use.

Per the established criteria, there is a storage capacity deficiency of about 0.15 MG for Zone 5 and 5A. Storage is provided in Sombrero Reservoir 7, which is a 1.5 MG steel reservoir constructed in 1990. Since the storage deficit is small and an additional source of supply is recommended (see Section 9-4.1), it is not proposed to immediately plan to replace the Sombrero Reservoir or construct more storage. A redundant pump station from Zone 2 to Zone 5 is recommended so that Zone 5 has more than one source of water supply. If/when Sombrero Reservoir is replaced due to its condition, the demand and storage needs for Zone 5 and 5A should be reanalyzed to ensure that sufficient storage is provided.

**Table 9-3
Storage Analysis by Zone**

Zone	1	2, 2A(1), 2A(2), 2A(3), 2B(1), 2B(2)	3	4, 4A, 4B	5, 5A	Total System
Average Day Demand (mgd)	0.88	4.61	0.34	0.30	0.42	6.55
Maximum Day Demand (mgd)	1.28	6.68	0.49	0.44	0.60	9.49
¹ Fire Flow Demand (gpm)	4000	4000	3500	2000	3500	4000
Fire Flow Duration (hrs)	4	4	4	2	4	4
² Fire Suppression Storage (MG)	0.96	0.96	0.84	0.24	0.84	3.84
³ Operational Storage (MG)	0.38	2.00	0.15	0.13	0.18	2.85
⁴ Emergency Storage (MG)	0.88	4.61	0.34	0.30	0.42	6.55
Fire + Operational + Emergency Storage (MG)	2.22	7.57	1.33	0.67	1.44	13.23
⁵ Total Storage Required (MG)	2.56	8.71	1.53	0.78	1.65	15.22
Existing Available Storage (MG)	4.04	10.28	2.00	1.50	1.50	19.32
Zone Surplus / Deficit (MG)	1.48	1.57	0.47	0.72	-0.15	4.10

¹ Highest fire flow required in zone

⁴ One average day demand

² Fire flow multiplied by duration

⁵ 1.15 x (fire + operational + emergency storage)

³ 30% of maximum day demand

9-4 Booster Pump Stations

9-4.1 Open Zones

For open zones (zones with storage reservoirs) with two or more sources of supply and sufficient fire demand storage, the firm capacity of the pump station(s) supplying water to the zone must meet the maximum day demands for the zone itself and any other zones it provides water to on a regular basis. The firm capacity is the total pump station capacity with the largest pump out of service.

For open zones with only one source of supply and/or insufficient fire demand storage, the firm capacity of the pump station(s) supplying water to the zone must meet the maximum day demands plus the fire flow demand for the zone itself and the zones it provides water to on a regular basis.

The analysis of the existing booster pump stations that supply water to open zones is shown in Table 9-4.

**Table 9-4
Booster Pump Station Analysis for Open Zones**

Zone	Pump Station	Total Pump Station Capacity (gpm)	^a Firm Capacity (gpm)	Total Firm Capacity to Zone (gpm)	Maximum Day Demand of Zone (gpm)	Total Maximum Day Demand (gpm)	Highest Fire Flow Demand Required in Zone (gpm)	Maximum Day plus Fire Flow Demand (gpm)	Pump Capacity Surplus or Deficit (gpm)
1	Delta Pumps 5 & 6	5,089	2,315	2,315	886	886	-	886	1,429
2	Delta Pumps 1, 2, 3, & 4	9,078	6,679	12,799	4,640	5,705 ^b	-	5,705	7,094
	La Loma	9,263	6,120						
3	Brightwood	2,585	1,245	1,245	342	342	-	342	903
4	Kingsford ^e	1,415	694	694	305	305 ^c	-	305	389
5	Vagabond ^e	2,081	1,323	1,323	418	418 ^d	3,500 ^f	3,918	-2,595

^a Firm Capacity is equal to pump capacity assuming the largest pump is out of service

^b Zone 2 demand includes Zone 2A(1), 2A(2), 2A(3), 2B(1), 2B(2), 3, 4, 4A, 4B, 5 and 5A demand

^c Zone 4 Zone 4 demand includes Zone 4A and 4B demand

^d Zone 5 Zone 5 demand includes Zone 5A demand

^e Currently has only one source of supply

^f Zone 5 and 5A does not have sufficient storage, therefore Vagabond PS is required to provide maximum day demands plus fire flow demands.

Zone 5 and 5A - Project M8

Vagabond Pump Station is currently the primary source of water supply to Zone 5 and 5A. The Ridgecrest 2 PRS can provide water from Zone 4A to Zone 5, but is normally closed and the flow through it would be limited by the small capacity (390 gpm) of Zone 4A Sequoia Pump Station. The Ridgecrest 2 PRS should not be relied upon as a redundant source of supply.

As previously stated, Zone 5 and 5A has a minor storage deficiency of 0.15 MG. The Vagabond Pump Station has a firm capacity of 1,323 gpm which is more than the 418 gpm maximum day demand of the two zones but less than the total required 3,918 gpm (maximum day plus fire flow demand).

Project M8 is the recommendation of a new pump station to increase the pumping capacity and provide a redundant source of supply to Zone 5 and 5A. A preliminary design report (PDR) is recommended to evaluate the following:

1. Condition assessment of Vagabond Pump Station and determination of any needed improvements.
2. Potential location of a new pump station (possibly in the vicinity of Monterey Pass Road and Fremont Avenue)

- Capacity of Vagabond Pump Station and potential new pump station, to ensure that the maximum day demand plus fire flow demand can be provided to Zone 5 and Zone 5A (possibly 4,000 gpm firm capacity to meet the maximum day and fire flow requirement, if Vagabond Pump Station is not in service).

9-4.2 Closed Zones

Booster pump stations that supply water to closed zones (zones without storage reservoirs) are required to deliver the maximum day plus fire flow demands for the areas served. The analysis of the existing booster pump stations that supply water to closed zones is shown in Table 9-5. Generally, the pump stations providing water to closed zones do not meet the pumping requirement with the exception of Sombrero Pump Station, which does not provide fire service to Zone 5A because it is provided via Zone 5 pipes and fire hydrants.

**Table 9-5
Booster Pump Station Analysis for Closed Zones**

Zone	Pump Station	^a Total Pump Station Capacity (gpm)	^b Firm Capacity (gpm)	Fire Pump Capacity (gpm)	Total Firm + Fire Pump Capacity to Zone (gpm)	Total Maximum Day Demand (gpm)	Highest Fire Flow Demand Required in Zone (gpm)	Maximum Day plus Fire Flow Demand (gpm)	Pump Capacity Surplus or Deficit (gpm)
2A(1)	Country	543	260	-	1,730	129	3,500	3,629	-1,899
	Ackley	2,253	1,470	-					
2A(2)	Russell	1,857	827	-	827	87	2,000	2,087	-1,260
2A(3)	Bradshawe	1,085	517	-	517	46	2,000	2,046	-1,529
4A	Sequoia	780	390	1,150	1,540	150	2,000	2,150	-610
5A	Sombrero ^c	177	87	-	87	17	-	17	70

^a Pump Capacity is based on efficiency test data.

^b Firm Capacity is the total pump capacity with the largest pump out of service

^c Fire hydrants are located on the Zone 5 system within the Zone 5A service area, therefore fire flow capacity does not need to be provided at Sombrero Pump Station

Zone 2A(1) - Project M7

The Country Pump Station and Ackley Pump Station are sufficiently sized to meet the maximum day and peak hour demands, but not the required fire flow demands for Zone 2A(1). It is recommended that a preliminary design report (PDR) be developed to determine the best way to meet all pumping requirements of Zone 2A(1). At minimum, the study should evaluate:

- Replacement of the Country Pump Station to provide increased capacity. The total firm capacity of the County Pump Station and the Ackley Pump Station should meet the maximum day and fire flow requirement (3,629 gpm).
- Addition of variable frequency drives (VFDs) on all pumps at Ackley Pump Station.
- Conversion of the Ackley Pump Station hydropneumatic tank to a surge tank.
- Installation of standby generators at Country Pump Station and Ackley Pump Station.
- Installation of transmission pipe to provide fire flow to Hillcrest Elementary School.

- Condition assessment of existing pump station facilities and determination of any needed improvements.
- Interagency connection with Golden State Water Company to increase fire flow capacity on Tegner Drive, east of Hillcrest Elementary School.

In addition, the land use for Zone 2A(1) is primarily residential, with the exception of the Hillcrest Elementary School. The planning level fire flow requirement for the school is 3,500 gpm, but may be reduced based the California Fire Code, requirements, which are summarized in Table 6-3 and Table 6-4. The recommended PDR should evaluate the specific fire flow requirement at the Hillcrest Elementary School from the actual building structure size, material, and if the structure has a fire sprinkler system. The recommended PDR should evaluate if a sprinkler system at the school would minimize the need for extensive system improvements.

Zone 2A(2) and Zone 2A(3) - Project M6

The Russell Pump Station and Bradshawe Pump Station are each sufficiently sized to meet the maximum day and peak hour demands, but not the required fire flow demands for Zone 2A(2) and Zone 2A(3), respectively. It is recommended that a PDR be developed to evaluate converting these two separate zones into a single closed hydraulic zone. The study should evaluate:

- Replacement of the Russell Pump Station to increase capacity. Installation of VFDs on all pumps.
- Replacement of the Bradshawe Pump Station to increase capacity. Installation of VFDs on all pumps.
- Ensure that the total firm capacity of the Russell Pump Station and the Bradshawe Pump Station meets the maximum day plus fire flow requirement (2,133 gpm) of the proposed combined zone.
- Conversion of the Russell Pump Station hydropneumatics tank and Bradshawe Pump Station hydropneumatic tank to surge tanks.
- Installation of transmission pipes to connect existing Zone 2A(2) and Zone 2A(3).
- Installation of standby generators at Russell Pump Station and the Bradshawe Pump Station.
- Condition assessment of existing pump station facilities and determination of any needed improvements.

Zone 4A - Project H5

Sequoia Pump Station provides water to Zone 4A. There is a dedicated fire pump with a capacity of 1,150 gpm. The highest fire flow requirement in Zone 4A is 2,000 gpm for low density residential land uses. It is recommended that the fire pump capacity be increased at Sequoia Pump Station.

9-5 System Pressures and Velocities

The hydraulic model was utilized to analyze the existing and future system under various demand conditions.

9-5.1 System Pressures

The minimum and maximum system pressures are summarized by pressure zone in Table 9-6. The minimum pressures throughout the system are shown graphically on Figure 9-1. Low pressure areas (less than 40 psi) are generally located near the zone boundaries, where the elevations are typically the highest within each zone.

**Table 9-6
System Pressures**

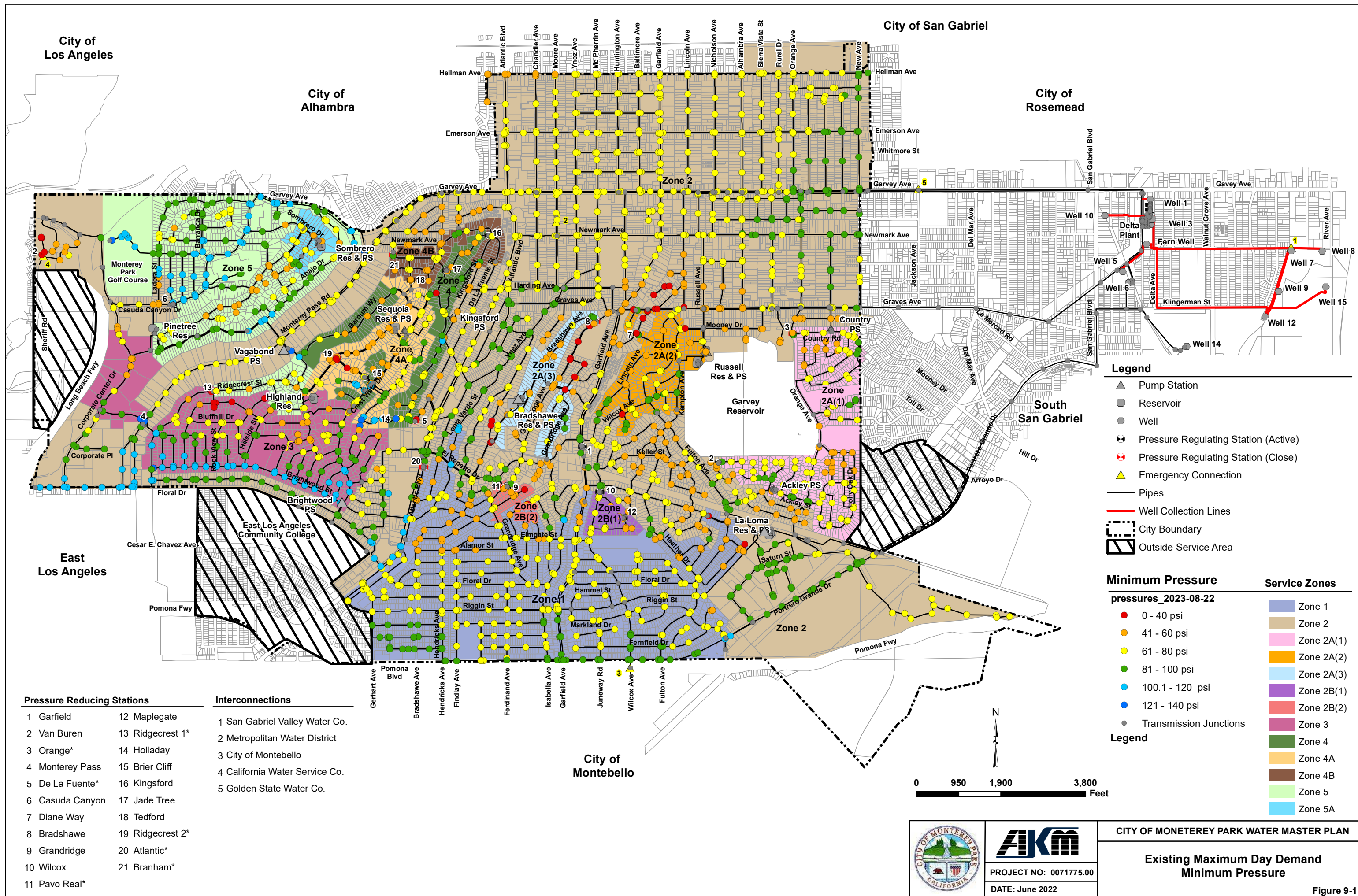
Pressure Zone Name	Hydraulic Grade Line (ft)	Service Elevation (ft)		Static Pressure Range ¹		Static Pressure Range ²	
		Min	Max	Min	Max	Min	Max
1	466	253	378	38	92	36	90
2	567	278	498	30	125	25	124
2A(1)	640	437	542	42	88	42	88
2A(2)	665	449	555	47	94	45	101
2A(3)	655	442	532	53	92	54	103
2B(1)	510	316	378	57	84	49	76
2B(2)	560	320	389	74	104	38	68
3	639	342	560	34	129	30	128
4	692	444	597	41	107	38	110
4A	816	513	699	51	131	51	132
4B	650	437	547	45	92	44	92
5	736	418	681	24	138	20	136
5A	805	614	691	49	83	55	89

¹ Calculated based on HGL and ground elevation

² Calculated based on hydraulic model results

The following projects identify low pressure areas (see Plate A) that are recommended to be evaluated and possibly changed so that the area becomes a part of a higher hydraulic zone.

- **Project H6** is located in Zone 2 along Cecil Street and Elamont Drive, north and south of Graves Avenue. The City has received some complaints of low pressures, which have prevented customers from installing and using private water filtration systems. Due to higher zone elevations in this area, system pressures as low as 30 psi were seen in the hydraulic model. It is recommended that the City evaluate connecting these pipes to the Zone 2A(2) system.
- **Project M3** is located in Zone 4A along Briercliff Way, between Rigecrest Street and Crest Vista Circle. Low system pressures and fire flow deficiencies were identified in this area. Currently, the nearby hydrants are connected to the 8-inch Zone 5 pipeline with 736' hydraulic grade elevation (HGL). There is a parallel 6-inch Zone 4A pipeline in Briercliff Way that has better looping with a higher HGL of 816'. It is recommended that two (2) new hydrants be connected to the Zone 4A system, and the existing 6-inch Zone 4A pipeline be replaced with an 8-inch pipe.



Pressure Reducing Stations

1 Garfield	12 Maplegate
2 Van Buren	13 Ridgcrest 1*
3 Orange*	14 Holladay
4 Monterey Pass	15 Brier Cliff
5 De La Fuente*	16 Kingsford
6 Casuda Canyon	17 Jade Tree
7 Diane Way	18 Tedford
8 Bradshawe	19 Ridgcrest 2*
9 Grandridge	20 Atlantic*
10 Wilcox	21 Branham*
11 Pavo Real*	

Interconnections

1 San Gabriel Valley Water Co.
2 Metropolitan Water District
3 City of Montebello
4 California Water Service Co.
5 Golden State Water Co.

Legend

- ▲ Pump Station
- Reservoir
- Well
- ⊗ Pressure Regulating Station (Active)
- ⊗ Pressure Regulating Station (Close)
- ▲ Emergency Connection
- Pipes
- Well Collection Lines
- ⊞ City Boundary
- ⊞ Outside Service Area

Minimum Pressure

pressures_2023-08-22

- 0 - 40 psi
- 41 - 60 psi
- 61 - 80 psi
- 81 - 100 psi
- 100.1 - 120 psi
- 121 - 140 psi
- Transmission Junctions

Service Zones

- Zone 1
- Zone 2
- Zone 2A(1)
- Zone 2A(2)
- Zone 2A(3)
- Zone 2B(1)
- Zone 2B(2)
- Zone 3
- Zone 4
- Zone 4A
- Zone 4B
- Zone 5
- Zone 5A



AKM

PROJECT NO: 0071775.00
DATE: June 2022

CITY OF MONTEREY PARK WATER MASTER PLAN

**Existing Maximum Day Demand
Minimum Pressure**

Figure 9-1

- **Project M4** is located in Zone 3 along Longhill Drive from Longhill Way to Hillside Street. Due to higher zone elevations in this area, system pressures as low as 30 psi were seen in the hydraulic model. There is no history of low pressure complaints from customers in this area. It is recommended that the City evaluate connecting these pipes to the Zone 5 system if customer complaints are received or when the pipes reach the end of their useful lives.
- **Project M5** is located in Zone 2 along Grandridge Avenue and Isabella Terrace, from Bradshaw Avenue to Roca Way. Due to higher zone elevations in this area, system pressures as low as 30 psi were seen in the hydraulic model. There is no history of low pressure complaints from customers in this area. It is recommended that the City evaluate connecting these pipes to the Zone 2A(3) system if customer complaints are received or when the pipes reach the end of their useful lives.

Before any boundary adjustments are made, the need for private pressure regulating valves must be evaluated if resulting pressures are expected to be higher than 80 psi. Also it is possible that the pipes may experience more leaks due to higher pressures if the zone boundaries are adjusted. The City will monitor the need for pipe replacement and rehabilitation due to higher pressures.

9-5.2 Pipe Velocities

The maximum day peak hour pipe velocities were below the 7 fps criteria for the entire system under all demand scenarios. No pipe deficiencies due to velocity were identified.

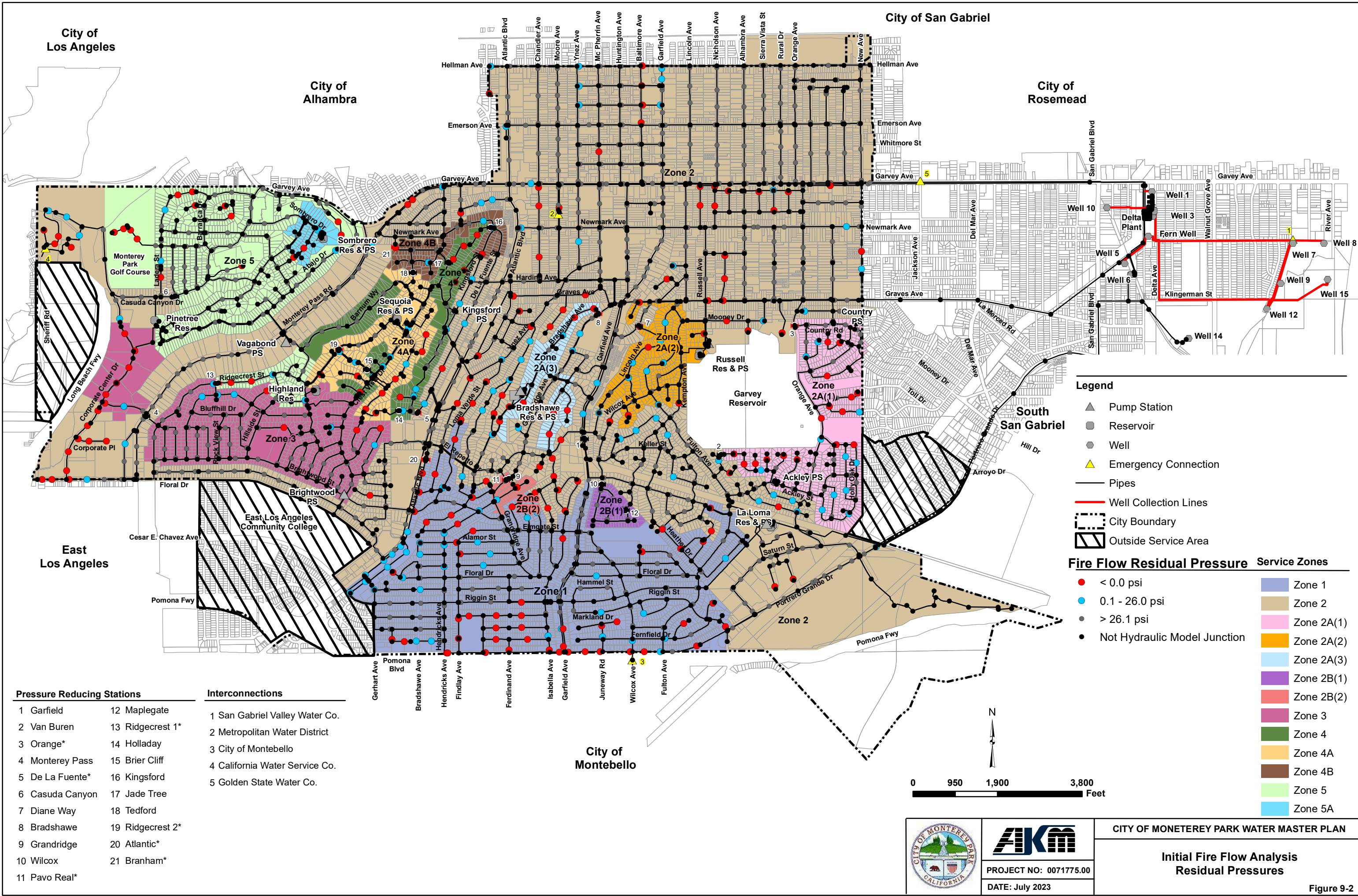
9-6 Fire Flow Analysis

The fire flow analysis was conducted utilizing the future maximum day demand scenario. Fire flow demands, listed in Table 6-1, were applied at all fire hydrant locations in the model. If the fire hydrant was located near multiple land use types, the highest fire flow demand was implemented.

As stated in Section 9-4.2, most of the closed zones do not have dedicated fire pumps in place, and therefore do not have the required capacity to provide the fire demand. In these cases, fire pumps were simulated in the model to determine if the existing distribution system could sufficiently deliver the fire flows if/when fire pumps are installed or when the capacity of the pump stations are increased in the future.

The fire flow criterion requires a residual pressure of 20 psi at the fire hydrant outlet. Since the City's hydraulic model only includes the location of the hydrant connection on the mainline and not the hydrant itself, a residual pressure of 26 psi was utilized for analysis purposes. It is estimated that there will be about 6 psi loss from the water main, through a typical 6-inch hydrant lateral to the fire hydrant outlet. Initially, the fire flow simulation was run globally, and the entire fire flow demand was applied to one fire hydrant connection point. This initially identified the areas with low residual pressures, as shown on Figure 9-2.

In reality, firefighting often takes place by using multiple fire hydrants with each providing approximately 1,000 gpm to 1,200 gpm of flow. Therefore, the next step in the analysis was to apply fire flow demand to multiple hydrants in the areas identified with low residual pressures and rerun the analysis. Often, the system was then able to meet the fire flow demands and provide the minimum residual pressure of 26 psi at the fire hydrant connection point.



Pressure Reducing Stations	
1 Garfield	12 Maplegate
2 Van Buren	13 Ridgecrest 1*
3 Orange*	14 Holladay
4 Monterey Pass	15 Brier Cliff
5 De La Fuente*	16 Kingsford
6 Casuda Canyon	17 Jade Tree
7 Diane Way	18 Tedford
8 Bradshawe	19 Ridgecrest 2*
9 Grandridge	20 Atlantic*
10 Wilcox	21 Branham*
11 Pavo Real*	

Interconnections	
1 San Gabriel Valley Water Co.	
2 Metropolitan Water District	
3 City of Montebello	
4 California Water Service Co.	
5 Golden State Water Co.	

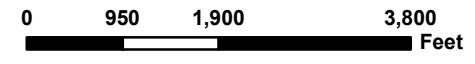
Legend

- ▲ Pump Station
- Reservoir
- Well
- ▲ Emergency Connection
- Pipes
- Well Collection Lines
- City Boundary
- ▨ Outside Service Area

Fire Flow Residual Pressure Service Zones

- < 0.0 psi
- 0.1 - 26.0 psi
- > 26.1 psi
- Not Hydraulic Model Junction

Zone 1
Zone 2
Zone 2A(1)
Zone 2A(2)
Zone 2A(3)
Zone 2B(1)
Zone 2B(2)
Zone 3
Zone 4
Zone 4A
Zone 4B
Zone 5
Zone 5A



AKM
 PROJECT NO: 0071775.00
 DATE: July 2023

CITY OF MONTEREY PARK WATER MASTER PLAN

**Initial Fire Flow Analysis
 Residual Pressures**

Figure 9-2

If the residual pressure criteria was still not met utilizing multiple hydrants in a certain area, improvement recommendations were developed, which either included pipe size increases, pipe looping, and/or addition or relocation of fire hydrants. There are areas where fire flows can be increased if the hydrant is connected to a larger pipe or a pipe in an adjacent zone.

Project recommendations for fire flow deficiencies include the following:

- 8-inch pipe replacement or system looping: 47,730 feet of pipe.
- 12-inch pipe replacement or system looping: 9,480 feet of pipe.
- Additional hydrants needed to meet fire flow requirements: 23 hydrants

Project locations are shown on Plate A. In addition to the aforementioned fire flow improvements, detailed descriptions of specific project recommendations follow below. These projects also improve fire flow conditions but focus on facility improvements versus pipe replacement and additional fire hydrants.

Zone 2

- **Project H1** is recommended to improve fire flows at the Los Angeles Sheriff's Department and Edmund D. Edelman Children's Courthouse, located in the northwest portion of Zone 2. A new pressure regulating station from Zone 5 to Zone 2 is recommended in the vicinity of the Monterey Park Golf Course. In addition, 12-inch pipe upgrades within Zone 2 at the golf course and a parallel 12-inch pipe on Ramona Boulevard below the 710 Freeway underpass are also recommended. This project should replace the currently planned water main extension project in the golf course.
- **Project M1** is recommended to improve fire flows in Zone 2 on Corporate Center Drive. The system experiences low pressures south of Davidson Drive due to the lack of system looping and high ground elevations. It is recommended that a study be conducted to identify the best way to improve fire flows and system pressures. Possible options to study include:
 1. Construction of a pressure regulating station connecting Zone 3 and Zone 2. The pressure regulating valves would be set to open based a low pressure setting in Zone 2.
 2. Construction of a 12-inch Zone 2 pipe on Corporate Center Drive between Davidson Drive and south of Casuda Canyon Drive. This line would parallel the existing Zone 3 line. It would provide better looping for Zone 2, which would increase pressures and fire flow availability.
- It should be noted that the fire flow analysis for the **Market Place development**, at Potrero Grande Drive and Greenwood Avenue, was conducted using a specific California Fire Code requirement based on the building square footages and the fact that the buildings are equipped with fire sprinkler systems. The fire flow analysis for this development was also conducted using the available private water system geometry.

Zone 2A(1)

- As detailed in Section 9-4.2, **Project M7** is the recommendation to develop a PDR to evaluate the fire flow requirements at the Hillcrest Elementary School and/or evaluate the necessary improvements at Country Pump Station and Ackley Pump Station.

Zone 2A(2) and Zone 2A(3)

- As detailed in Section 9-4.2, **Project M6** is the recommendation to develop a PDR to evaluate the necessary improvements to combine existing Zone 2A(2) and Zone 2A(3) into one single hydraulic zone. The evaluation should include analysis of the necessary pump improvements at Russell Pump Station and Bradshawe Pump Station, as well as the transmission pipeline that is needed to connect the two zones. For budgeting purposes, the following pipes are assumed to be needed to connect the two zones:
 1. Graves Avenue, between Bradshawe Avenue and Craighurst Terrace
Graves Avenue, between Craighurst Terrace and Lincoln Avenue – 1,900 ft
 2. Lincoln Avenue, north of El Repetto Drive and
El Repetto Drive, between Isabella Avenue and Lincoln Avenue – 1,800 feet

Without connecting Zone 2A(2) and Zone 2A(3), pipe upgrades larger than 8-inches in diameter would be needed to meet fire flow demands and pressures. This potentially could cause water quality issues because the water may sit in the larger diameter pipes for long periods of time.

Zone 3

- **Project H2** is recommended to increase fire flow pressures in the western portion of Zone 3 along Corporate Center Drive. This area is located relatively far from the Highland Reservoirs and Brightwood Pump Station and therefore, needs additional supply to meet the fire flow requirements. It is recommended that a new PRS be constructed in the vicinity of Pinetree Reservoir from Zone 5 to Zone 3. The pressure regulating valves would be set to open based a low pressure setting in Zone 3. Approximately 600 feet of 8-inch pipe would also be needed to tie the existing Zone 5 pipe in Arriba Drive to the existing Zone 3 pipe in Pinetree Park.
- **Project H3** is the recommendation to conduct a PDR to evaluate eight (8) pressure regulating stations that are currently inactive or not in operation. The Ridgecrest 1 PRS needs to be evaluated. The Zone 3 area near Longhill Way and Ridgecrest Street does not meet the fire flow requirements. Putting Ridgecrest PRS back into service will alleviate the deficiency. Details regarding Project H3 are detailed further in Section 9-7.

Zone 4A

- As detailed in Section 9-4, the fire pump at Sequoia Booster Pump Station was found to be undersized. **Project H5** includes the recommendation to replace the existing 1,150 gpm fire pump with a 2,000 gpm fire pump.

Zone 5 and Zone 5A

- As detailed in Section 9-4, closed Zone 5A is provided fire flow service via fire hydrants connected to Zone 5 pipes. Fire flow deficiencies were identified throughout the Zone 5A service area. **Project H4** is the recommendation for the construction of a 12-inch pipe in Avion Drive from Verde Vista Drive to Sombrero Drive. This would make a complete 12-inch loop of the Zone 5 system and provide sufficient fire flow and residual pressures in the Zone 5A service area. To increase the fire flow capacity near the Sombrero Reservoir, it is recommended that the existing hydrant at Sombrero Drive and Arriba Drive be connected to

the Zone 5 pipe, instead of Zone 5A. Two (2) additional hydrants should also be installed at the following locations:

1. Sombrero Drive, east of Ariba Drive. The hydrants should be closer to Ariba Drive than Avion Drive to meet fire flow pressure requirements.
2. Avion Drive, south of Sombrero Drive

9-7 Reliability and Redundancy Recommendations

9-7.1 Imported Water Scenario

Model scenarios were run using groundwater that is supplied to the system via the Delta Pumping Plant. In an emergency event, the City may be required to use imported water as its primary source of supply. The City has not operated the system in this manner in recent years. It is not planned to make imported water supply a typical system operating scenario. This condition is for emergency purposes only.

An additional existing maximum day demand (MDD) scenario was run with imported water as the main source of supply. This scenario simulates an outage at the Delta Booster Pump Station, an outage of the treatment plant, and/or a restriction to the use of groundwater from the wells.

This model scenario assumes the following:

- Imported water is the City's only source of supply
- Imported water is supplied to Zone 2 by the Metropolitan Water District (MWD) connection, located on Moore Avenue, north of Newmark Avenue
- It is assumed that water may be supplied to Zone 1 from Zone 2 at the Garfield PRS

The model results showed that the system can maintain adequate system pressures and velocities when the source of supply is through the MWD connection located on Moore Avenue, north of Newmark Avenue.

Based on discussions with the City's operation and maintenance staff, water quality is the main concern when the City is transitioning from using groundwater to using imported water, and vice versa. As detailed in Section 5-9, the blending of chlorinated groundwater and chloraminated imported water can affect the taste and odor of the finished water, and it may reduce the disinfecting capability of the chloramines. The City should plan on conducting additional water sampling the source of supply needs to be changed. Additional flushing may be required to make sure that the chlorine residuals remain at or above 0.2 PPM.

9-7.2 Redundancy Projects

Zone 2

- As part of the calibration process, the City's operation and maintenance staff identified an inoperable valve on the 18-inch pipe located in Grandridge Avenue, west of Garfield Avenue. Currently, the City utilizes other nearby valves to isolate the system whenever necessary. **Project L1** is the recommendation to replace this inoperable valve.
- There is a single 12-inch pipe located between Russell Reservoirs and the Russell Pump Station. **Project L2** is the recommendation for a parallel 12-inch pipe, which will provide redundancy for moving water in and out of the reservoirs.

Zone 3

- Brightwood Pump Station is currently the primary source of water supply to Zone 3. **Project M2** is the recommendation for a new pressure regulating station with electronic controls to supply water from Zone 5 to Zone 3. This will provide a redundant source of supply to Zone 3. A preliminary design report (PDR) should be developed to determine the best location for the new pressure regulating station (possibly near Highland Reservoir).

9-7.3 Pressure Regulating Stations

The following four (4) PRS were equipped with valves, vaults, and pilotry, but were not placed into service:

1. Orange PRS
2. Pavo Real PRS
3. Atlantic PRS
4. Branham PRS

In addition, the following four (4) PRS are currently closed at all times. In an emergency scenario, the valves have to be manually opened.

- Ridgecrest 1 PRS
- Ridgecrest 2 PRS
- Bradshaw PRS
- De La Fuente PRS

For these eight (8) PRSs, it is recommended that a PDR be conducted to evaluate the work that is needed to place them into service. **Project H3** is the recommendation to evaluate the valve pressure settings, needed to automate the system during normal operations, fire flow conditions, and/or other emergency operations. The current physical conditions of the PRSs are unknown and should also be evaluated. It should be determined if the valves need to be replaced.

With the exception of the Atlantic PRS, the remaining seven (7) PRSs are currently equipped with a single valve. The study should also identify if additional valves are necessary and can be added to the existing valve vaults.

SECTION 10

PIPELINE RISK ASSESSMENT

10-1 Introduction

Risk relates to the probability of something bad happening, or the likelihood of a negative impact occurring, and over time, a water distribution system will experience water breaks or leaks. These failures in a water system can be caused by multiple factors such as pipe age, pipe material, pipe bedding, internal pressures, water characteristics, external loads (from traffic or soils), soil characteristics, and/or weather. Some of the primary goals of a water utility is to prevent catastrophic failures from occurring, address breaks and leaks as quickly as possible, and continue to provide reliable and safe water to its customers while minimizing disruptions to service.

As a part of the Water Master Plan, a risk analysis of the water pipes was conducted to mitigate future pipe failures that are associated with pipes in poor condition. The analysis utilized the existing model pipe geometry, historical break data from 2007 through 2021, and the hydraulic analysis results.

Risk is the combination of both Likelihood of Failure (LoF) and Consequence of Failure (CoF). It takes into account the asset's physical condition, as well as the impact that its failure would have on system performance. LoF refers to a calculated numerical representation that denotes the probability of failure based on an asset's physical and hydraulic condition. CoF is the combination of direct and indirect impacts on the vicinity and community due to a potential asset failure. Risk is calculated as the product of the LoF and CoF.

$$\text{Risk} = \text{Likelihood of Failure (LoF)} \times \text{Consequence of Failure (CoF)}$$

AquaTwin Asset, an ArcGIS Pro based software, was utilized to conduct the risk analysis for the City's system. AquaTwin Asset is a powerful tool that assists in characterizing the likelihood and consequence of failure for individual pipes in the network. It has the capability to incorporate any asset data that is in the City's geodatabase or shapefiles and the hydraulic water model.

The risk assessment enables the City to take multiple factors into consideration to predict locations of future failures and enable the City to develop a proactive rehabilitation and pipe replacement program.

10-2 Historical Pipe Break Data

This historical pipe break data (351 breaks) was plotted on the water system map. Each break was assigned to the nearby pipe by location. The number of breaks categorized by material, year of construction, and pipe diameter are shown in Table 10-1 through Table 10-3.

At face value, it appears that cast iron pipe, those pipes constructed between 1950 and 1959 and 6-inch pipes are the root problem because those are the features of the pipes that the most breaks occur on. But the system is primarily made up of pipes that fall within these categories as shown on Figure 5-3 through Figure 5-5.

In order to evaluate the true causes of the historical breaks, the data was normalized by material, year of construction, and diameter. The normalized data is shown on Figures 10-1 through Figures 10-3. The following conclusions can be made by reviewing the normalized data:

1. Steel pipe is very problematic in relation to other pipe materials.
2. Pipes constructed between 1920-1929 are more likely to break than pipes constructed in later years.
3. Pipes 6-inch and smaller break more frequently than larger pipes

It should be noted that there were 32 breaks recorded on 5 inch steel pipe constructed in 1930. This pipe is 1,435 feet long and located in Garfield Avenue, south of Graves Avenue. This reach of pipe accounts for the majority of the historical breaks on steel pipe, pipes constructed in the 1930's and pipes that are 5-inches in diameter.

Material	No. of Breaks	Length (ft)
Cast Iron Pipe	232	275,277
Steel	37	3,796
Steel Cylinder Concrete Ppe	0	48,924
Asbestos Cement Pipe	77	220,299
Mortar Lined and Coated Steel Pipe	5	18,775
Unknown	0	144,049
Total	351	711,119

Construction Year	No. of Breaks	Length (ft)
1920-1925	20	89,082
1925-1935	103	6,006
1935-1945	8	98,102
1945-1955	140	219,043
1955-1965	67	87,638
1965-1975	10	51,084
1975-1985	3	17,069
1985-1995	0	17,803
1995-2005	0	22,054
2005-2015	0	26,221
2015-2023	0	11,584
Unknown	0	65,433
Total	351	711,119

Diameter	No. of Breaks	Length (ft)
2"	6	3,485
4"	62	59,210
5"	32	1,811
6"	162	207,740
8"	51	208,772
10"	3	63,273
12"	34	87,280
14"	0	3,922
16"	0	17,004
18"	1	43,714
20"	0	1,050
24"	0	13,858
Total	351	711,119

Figure 10-1
Normalized Number of Breaks by Pipe Material



Figure 10-2
Normalized Number of Breaks by Year of Construction

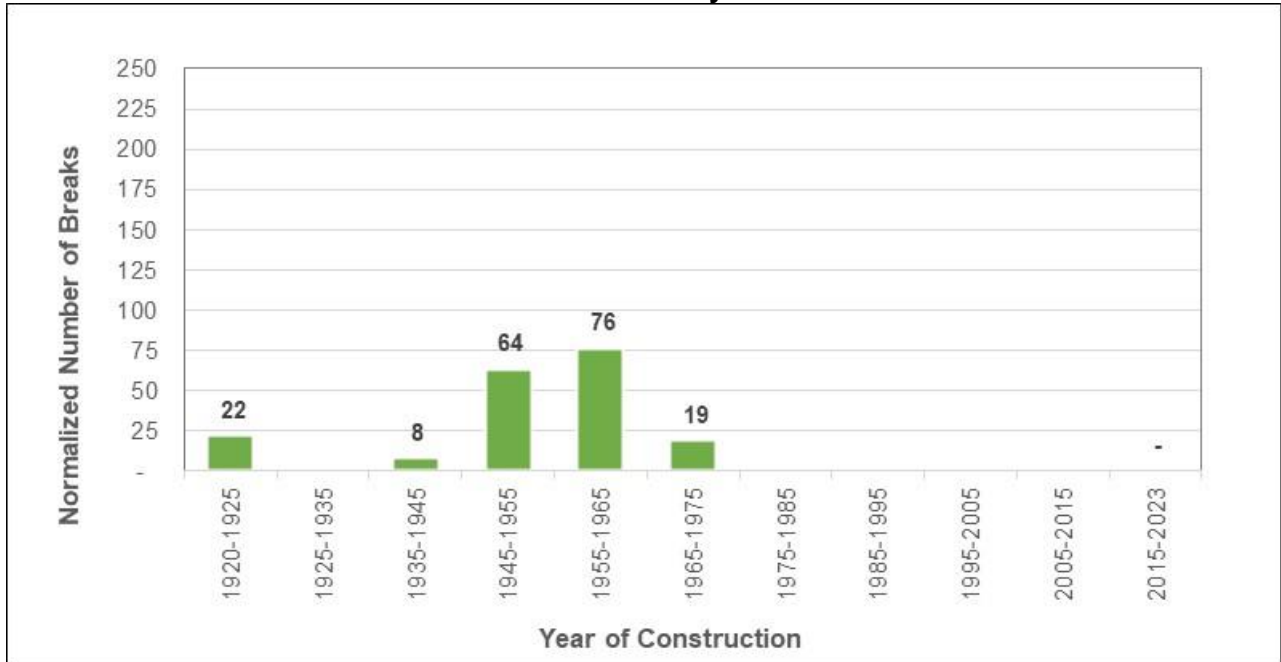
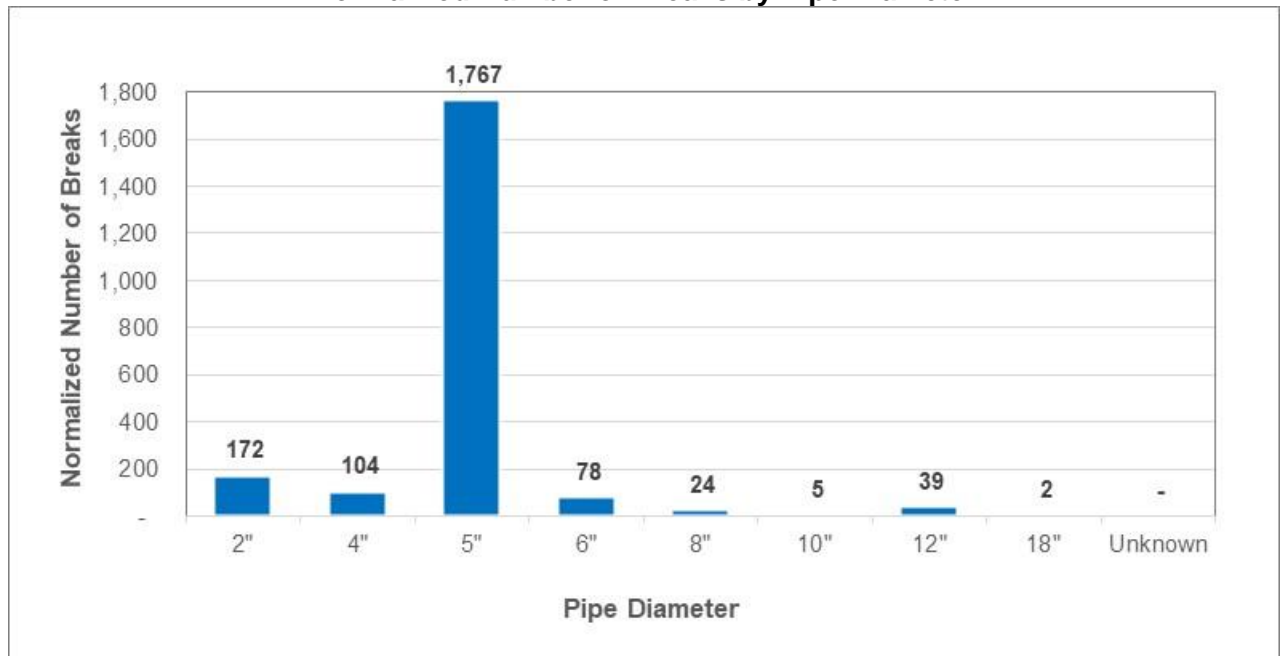


Figure 10-3
Normalized Number of Breaks by Pipe Diameter



10-3 Risk Assessment

The pipe risk assessment includes an evaluation of various elements that affect the likelihood of failure (LoF) and consequence of failure (CoF). Each of the LoF and CoF elements are assigned different weighting factors depending on the goals and priorities of a utility. The overall LoF and CoF scores are calculated as a weighted average of all individual LoF and CoF element scores. The

weighting factors selected for this study are shown in Table 10-4. The trends in the break data guided the development of the likelihood of failure (LoF) weightings factors and risk scores. The consequence of failure (CoF) incorporated the overall maximum flow through each pipeline. The pipes that convey more water through the system are prioritized higher because more water in a pipe is an indication that a break could affect more customers, more water could potentially be lost, and the cost to repair the pipe could be higher.

**Table 10-4
Weighting Factors and Risk Scores**

Likelihood of Failure Element	Weighting Factor
Number of Breaks	3
Material	2
Year of Construction	2
Diameter	1
Maximum velocity	1

Year of Construction	Risk Score
1920-1965	10
1965-1975	5
1975- 2023	1

Diameter	Risk Score
0"-4"	10
5"-6"	5
8"-Higher	1

Maximum Velocity	Risk Score
7 - 21 ft/s	10
5 - 7 ft/s	8
2 - 5 ft/s	6
0 - 2 ft/s	2

Material	Risk Score
CIP, STL, UNK	10
ACP	8
Copper	5
ML&CSP, SCCP	3
PVC, DIP, GV, HDPE	1

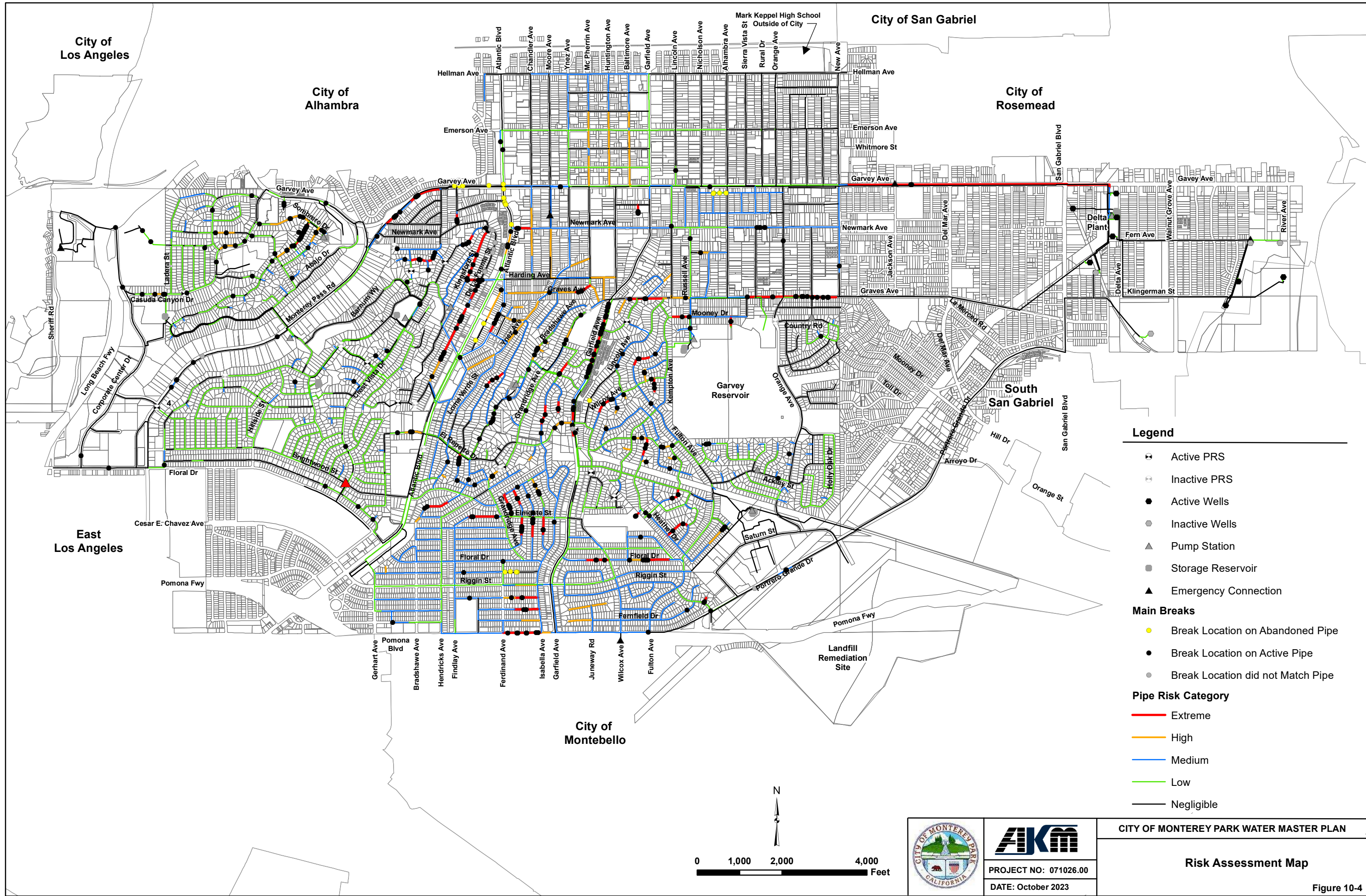
Consequence of Failure Element	Risk Score
More than 10,000 gpm	10
3,000 gpm to 10,000 gpm	8
1,000 gpm to 3,000 gpm	4
0 to 1,000 gpm	2

Number of Breaks	Risk Score
5 - 18	10
2 - 5	8
1	2
0	1

ACP = Asbestos Cement Pipe
 CIP = Cast Iron Pipe
 DIP = Ductile Iron Pipe
 GV = Galvanized Pipe
 HDPE = High Density Polyethylene
 ML&CSP = Mortar Lined and Coated Steel Pipe
 PVC = Polyvinyl Chloride
 SCCP = Steel Cylinder Concrete Pipe
 STL = Steel Pipe
 UNK = Unknown Material

10-4 Risk Analysis Results

The risk analysis results are shown on Figure 10-4. The risk values were grouped into Extreme Risk, High Risk, Medium Risk, and Low Risk categories. The top 2% of pipelines with the highest risk value were categorized as pipes with Extreme Risk. This accounts for about 31,700 feet of pipeline. The next 3% of pipelines were categorized as High Risk. This accounts for about 30,500 feet of pipe.



Legend

- Active PRS
- Inactive PRS
- Active Wells
- Inactive Wells
- Pump Station
- Storage Reservoir
- Emergency Connection

Main Breaks

- Break Location on Abandoned Pipe
- Break Location on Active Pipe
- Break Location did not Match Pipe

Pipe Risk Category

- Extreme
- High
- Medium
- Low
- Negligible

SECTION 11

CAPITAL IMPROVEMENT PROGRAM

11-1 General

The Capital Improvement Program (CIP) consists of projects that will enhance the distribution system to meet the established criteria, properly maintain the system's assets, and replace the facilities that have reached the end of their useful lives. The goal of the CIP is to provide the City of Monterey Park with a long-range planning tool for implementing its water system improvements in an orderly manner and a basis for financing of these improvements. In order to accomplish this goal, it is necessary to estimate project costs of the recommended system improvements, establish a basis, and prioritize the projects.

It should be noted that some of the improvements recommended herein are conceptual in nature based on existing available information. Therefore, they should not be considered as absolute for final design. Further analysis and refinement will be necessary prior to commencing work on the final plans, specifications, and cost estimates for each project. Detailed preliminary design studies should be prepared to select the final design projects.

11-2 Project Cost Estimates

11-2.1 Pipeline Construction Cost Estimates

Proposed pipe replacement project costs are planning level estimates based upon recent information provided by the City for similar projects, and they include contingencies for this planning level study. Specific alignments and refined cost estimates should be developed as part of the preliminary design phase for each recommended project.

The following construction costs were utilized for hydraulic system improvement projects (Section 9) and pipe risk improvement projects (Section 10).

1. Pipeline replacement cost = \$100 per diameter inch per foot of pipe. The replacement costs are based on pipeline replacement projects the City implemented in Fiscal Year 2021-2022.
2. Addition of a fire hydrant to an existing water main or reconnection of a fire hydrant lateral to an existing water main cost = \$25,000

11-1.2 Total Project Cost Estimates

The total project costs include construction, contingency, design and administrative, and construction management and inspection costs. The individual cost components are calculated as follows:

1. Construction Cost = Unit Cost x Recommended Units
2. Design and Administrative Cost = 15% of the Construction Cost
3. Construction Management Cost = 15% of the Construction Cost
4. Contingency Cost = 20% of the Construction Cost
5. Total Project Cost = Construction Cost + Design and Administrative Cost + Construction Management Cost + Contingency Cost

$$\text{Total Project Cost} = 1.5 \times \text{Construction Cost}$$

The recommended facility improvement cost estimates are planning level estimates based upon recent project experience and vendor estimates. Refined cost estimates should be developed as part of the preliminary design phase for each recommended project.

In addition, construction costs are expected to fluctuate as changes occur in the economy. These costs should therefore be reevaluated and updated annually based upon Engineering News Record (ENR) Index for the Los Angeles area (ENRLA), with the base ENRLA Index of 15,298.94 for October 2023.

11-3 Project Priorities

The primary consideration in establishing project priorities for the capital improvement program list must always be given to the health, safety and welfare of the public and the customers. The recommended projects are illustrated on Plate A, and summarized in Table 11-1.

Improvement projects were grouped into “High,” “Medium,” and “Low” priorities, based on correspondence with City staff. Although recommended projects are assigned a priority for this Master Plan study, the City should review the prioritization and adjust it to respond to changed conditions and to take advantage of concurrent construction, such as street paving projects or adjacent infrastructure work.

11-3.1 Fire Flow Pipe Replacement Priorities

Fire flow pipe replacement and pipe looping improvements were developed as part of the hydraulic model analysis, as detailed in Section 9. In addition, pipes with risk category “Extreme Risk” (Section 10-4), were also recommended for improvement.

Pipe replacements for fire flow deficiencies were given the higher Priority 1, when the pipe is also categorized as “Extreme Risk”. All other fire flow improvements are categorized as Priority 2, as detailed on Plate A and Table 11-1.

11-4 Improvement Projects

In addition to the projects developed and recommended based on the hydraulic analysis (Section 9) and the risk analysis (Section 10), projects were identified based on City staff knowledge and based on the 2012 Water Master Plan recommendations that have not yet been implemented.

As part of the 2012 Water Master Plan, facility assessments of each well, pump station, reservoir, and treatment plant were conducted. The condition was documented, and improvement projects were developed. Projects that were identified in 2012 but not addressed by the City since then were added as projects for this Master Plan as well.

The additional projects incorporated into the CIP are as follows:

1. **Project H7** is an evaluation of the existing electrical panels at all wells, pump stations and treatment plants and the development of a standard electrical panel design.
2. **Project H8** is the replacement of all 14,100 existing customer water meters with advanced metering infrastructure (AMI). The City wants to migrate to AMI to reduce the amount of unaccounted for water in its system.
3. City staff identified the need for generators at the wells, treatment plant, and pump stations, such that these key facilities have redundant sources of power. **Project H9** is the

recommendation for generators at all 8 wells and 8 pump stations. There are pump station replacement project recommendations at Country Pump Station (**Project M7-A**), Russell Pump Station (**Project M6-A**) and Bradshawe Pump Station (**Project M6-B**), which each include installation of generators. These costs are excluded from the Project H9 estimate. Generators at the Delta Plant are also recommended, primarily as backup power for the ultraviolet advanced oxidation processes (UVAOP).

4. **Project M-9** is the recommendation for the replacement of the two Delta Plant Settling Tanks, each with 1MG capacity. It is also recommended that the existing pump station shelter be replaced with a pump station building, as part of the pump station replacement. This was a project recommendation in the 2012 Water Master Plan resulting from facility assessments.
5. **Project M-10** is the replacement of Bradshawe Reservoir. This was a project recommendation in the 2012 Water Master Plan resulting from facility assessments. Bradshawe Reservoir was identified to be in poor condition and at the end of its useful life.
6. **Project M-11** is the replacement of Pinetree Reservoir if the ring wall connection cannot be repaired. This was a project recommendation in the 2012 Water Master Plan resulting from facility assessments. The floorplate was observed to be more than 3-inches above the ring wall at Pinetree Reservoir.
7. **Project M-12** is the upgrade of the City's Water Utility Office Building. This was a project recommendation in the 2012 Water Master Plan.
8. The City is concerned about its aging water pipes, especially in areas characterized by old pipes and high system pressures. **Project M-13** is the recommendation to develop a program and/or invest in a system to monitor pipe breaks and leaks.

Syrinx, a Badger Meter Brand, may assist the City with implementing such a program. Syrinx offers sensors that collect pressure transient data and acoustic leak detection data. The Syrinx sensors provide high-resolution sampling which is used to help detect pressure transients caused by changes in system operations, pipe breaks, emergency fire flow events, etc. The sensors also gather acoustic leak detection data that can identify when and where leaks are occurring. The real-time data is available on the Syrinx "RADAR" cloud-based platform. Alarms may also be set up to notify the City when the system experiences pressure transients, pipe breaks, and/or leaks in the system.

Syrinx provides services for installation, expert hydraulic analysis services, software training, and equipment training. The extent of the monitoring effort will vary significantly based on the City's goals. For planning purposes, the CIP includes the installation of 30 acoustic sensors, training, hydraulic analysis services, and 12-months of "RADAR" access. For 30 acoustic sensors, the "RADAR" software subscription cost is \$12,000, as of November 2023, which needs to be renewed annually.

9. **Project M14** is the recommendation to upgrade the City's SCADA system to include PRS data and flowrates at the Brightwood Pump Station, Ackley Pump Station, Bradshawe Pump Station, and Russell Pump Station. This was a project recommendation in the 2012 Water Master Plan.

10. Five (5) wells are currently past their useful lives (over 60 years old). Even though the City does not have any condition related concerns with the wells currently, **Project L3** is recommended to replace two (2) wells to actively prevent failures in the future.

11-5 Capital Improvement Program Summary

The total Capital Improvement Program costs are as follows:

High Priority Improvement Projects	\$ 39.4M
Medium Priority Improvement Projects	\$ 92.1M
High Priority Improvement Projects	\$ 9.7M
Priority 1: Fire Flow Improvement Projects	\$ 4.6M
Priority 2: Fire Flow Improvement Projects	\$ 69.7M
Additional Hydrants: Fire Flow Improvement Projects	\$ 0.9M
<u>Extreme Risk Improvement Projects</u>	<u>\$ 34.6M</u>
Total	\$251.0M

Table 11-1
Capital Improvement Program

Priority	Project ID	Map ID	Justification	Type	Location / Address	Additional Project Information	Zone	Capacity (gpm)	Size (in)	Length (ft)	Facility Const. Cost	Facility Total Cost ¹	Pipe Constr. Cost	Pipe Total Cost ¹	Total Constr. Cost	Total Project Cost ¹
High	H1	H1-A	Fire Flow	PRS	New PRS from Zone 5 to Zone 2, Monterey Park Golf Course	Increase fire flow at Los Angeles Sheriff Department and Children's Court House, west of 710 Freeway.	2	-	-	-	\$650,000	\$975,000	-	-	\$3,230,000	\$4,845,000
		H1-B		Pipe	Monterey Park Golf Course	Upsize the existing 8-inch pipe to 12-inch through the golf course. Install a parallel 12-inch pipe on Ramona Blvd, below the 710 Freeway underpass.		-	12	2,150	-	-	\$2,580,000	\$3,870,000		
High	H2	H2-A	Fire Flow	PRS	New PRS from Zone 5 to Zone 3, Arriba Dr and Abajo Dr (Near Pinetree Reservoir)	Increase fire flow in Zone 3, on Corporate Center Dr, via recommended PRS from Zone 5.	3	-	-	-	\$650,000	\$975,000	-	-	\$1,130,000	\$1,695,000
		H2-B		Pipe	Ariba Dr and Abajo Dr, south of Pinetree Reservoir	8-inch transmission pipeline to supply Zone 3		-	8	600	-	-	\$480,000	\$720,000		
High	H3	H3-A	Inactive PRS	Evaluation	Orange, Pavo Real, Ridgecrest 1, Atlantic, Branham, Ridgecrest 2, Bradshaw, De La Fuente	Existing valve equipment and vault are constructed. A PDR is needed to identify what equipment is necessary and what work must be completed prior to placing the PRSs into operation. The PDR should include a condition assessment of each PRS.	-	-	-	-	\$400,000	\$600,000	-	-	\$550,000	\$750,000
		H3-B		PRS		Valve replacement costs were provided, in the event that the existing valves are inoperable.		-	-	-	\$150,000	\$150,000	-	-		
High	H4	H4-A	Fire Flow	Pipe	Avion Drive, between Verde Vista Dr and Sombrero Dr	Pipe looping to Zone 5, near Sombrero Reservoir. Provide fire flow to Zone 5 and 5A.	5 & 5A	-	12	1,260	-	-	\$1,512,000	\$2,268,000	\$1,562,000	\$2,343,000
		H4-B		Hydrants	Sombrero Dr, east of Ariba Drive. Avion Dr south of Sombrero Dr.	Add two hydrants to increase fire flow: - Sombrero Dr, east of Ariba Dr. - Avion Dr, south of Sombrero Dr.	5 & 5A	-	-	-	\$50,000	\$75,000	-	-		
High	H5	H5	Pump Station Capacity	Pump Station	Sequoia PS (Zone 4 to Zone 4A), 736 Crest Vista Dr	Replace the fire pump to increase capacity to provide 2,000 gpm. Project H9 includes providing emergency power to Sequoia PS.	4A	Fire pump capacity 2,000 gpm	-	-	\$500,000	\$750,000	-	-	500,000	750,000
High	H6	H6	Low System Pressure	Zone Boundary Evaluation	Graves Ave, west of Lincoln Av	Evaluate updating service zone boundaries for pipes near Diane PRS, from Zone 2 to Zone 2A(2). Due to high elevations the system pressures are about than 30 psi in Zone 2.	2	-	-	-	\$30,000	\$45,000	-	-	30,000	45,000
High	H7	-	Condition	Evaluation	-	City Recommendation to conduct condition assessment of existing electrical panels.	-	-	-	-	\$350,000	\$525,000	-	-	\$500,000	\$750,000
		-		Design Standard	-	City recommendation to develop design standards for electrical panels.		-	-	-	\$150,000	\$225,000	-	-		

Table 11-1 (Continued)
Capital Improvement Program

Priority	Project ID	Map ID	Justification	Type	Location / Address	Additional Project Information	Zone	Capacity (gpm)	Size (in)	Length (ft)	Facility Const. Cost	Facility Total Cost ¹	Pipe Constr. Cost	Pipe Total Cost ¹	Total Constr. Cost	Total Project Cost ¹
High	H8	-	Condition	Meters	-	City recommendation to replace existing meters with AML.	-	-	-	-	\$10,000,000	\$15,000,000	-	-	10,000,000	15,000,000
High	H9	-	Condition	Emergency Power	Wells	City recommendation to provide emergency power to all wells (8)	-	-	-	-	\$3,000,000	\$4,500,000	-	-	8,800,000	13,200,000
		Pump Stations			City recommendation to ensure that there is emergency power at all pump stations. 8 pump stations are included with the cost estimate. It does not include adding generators at Country PS, Russell PS, and Bradshawe PS since the backup power costs are already included in each specific pump station replacement project.	-		-	-	\$4,800,000	\$7,200,000	-	-			
		Delta Plant			Recommendation to include backup power at the treatment UV trains.	-		-	-	\$1,000,000	\$1,500,000	-	-			
Medium	M1	M1-A	Fire Flow	PRS	New PRS from Zone 3 to Zone 2, Corporate Center Dr, south of Davidson Dr	Conduct evaluation to install a parallel 12-inch pipe that would connect the dead-end pipes in Zone 2. Evaluate option to add a new Zone 3 to Zone 2 PRS station. (Project cost estimate is based on 12-inch parallel pipe)	2	-	-	-	\$650,000	\$975,000	-	-	\$2,814,000	\$4,221,000
		M1-B		Pipe	Corporate Center Drive, between Davidson Dr and south of Casuda Canyon Dr			-	12	2,320	-	\$2,784,000	\$4,176,000			
		M1-C		Evaluation	-			-	-	\$30,000	\$45,000	-	-			
Medium	M2	M2-A	Redundancy	PRS	New PRS (Zone 5 to Zone 3), Highland Dr, south of Highland Reservoir	Provide redundant supply to Zone 3, if Brightwood Pump Station is out of service.	3	-	-	-	\$650,000	\$975,000	-	-	\$680,000	\$1,020,000
		M2-B		Evaluation	Develop PDR to identify best location for new PRS	-		-	-	\$30,000	\$45,000	-	-			
Medium	M3	M3-A	Low System Pressure	Pipe	Briercliff Way, between Ridgecrest and Crest Vista	Existing hydrants are connected to Zone 5 system. Move hydrants and laterals to the Zone 4A system to increase pressures and improve fire flows.	5	-	8	1,030	-	-	\$824,000	\$1,236,000	\$874,000	\$1,311,000
		M3-B		Hydrants	Install 2 new hydrants	-		-	-	\$50,000	\$75,000	-	-			
Medium	M4	M4	Low System Pressure	Zone Boundary Evaluation	Longhill Dr, west of Hillside St	Conduct evaluation to update the service zone boundary for pipes near Ridgecrest St. Due to high elevations, the system pressures are less than 30 psi, in Zone 3.	3	-	-	-	\$30,000	\$45,000	-	-	\$30,000	\$45,000
Medium	M5	M5	Low System Pressure	Zone Boundary Evaluation	Grandridge Ave, north of Roca Wy	Conduct evaluation to update the service zone boundary for pipes near Bradshawe PRS. Due to high elevations, the system pressures are about 30 psi, in Zone 2.	2	-	-	-	\$30,000	\$45,000	-	-	\$30,000	\$45,000

Table 11-1 (Continued)

Capital Improvement Program

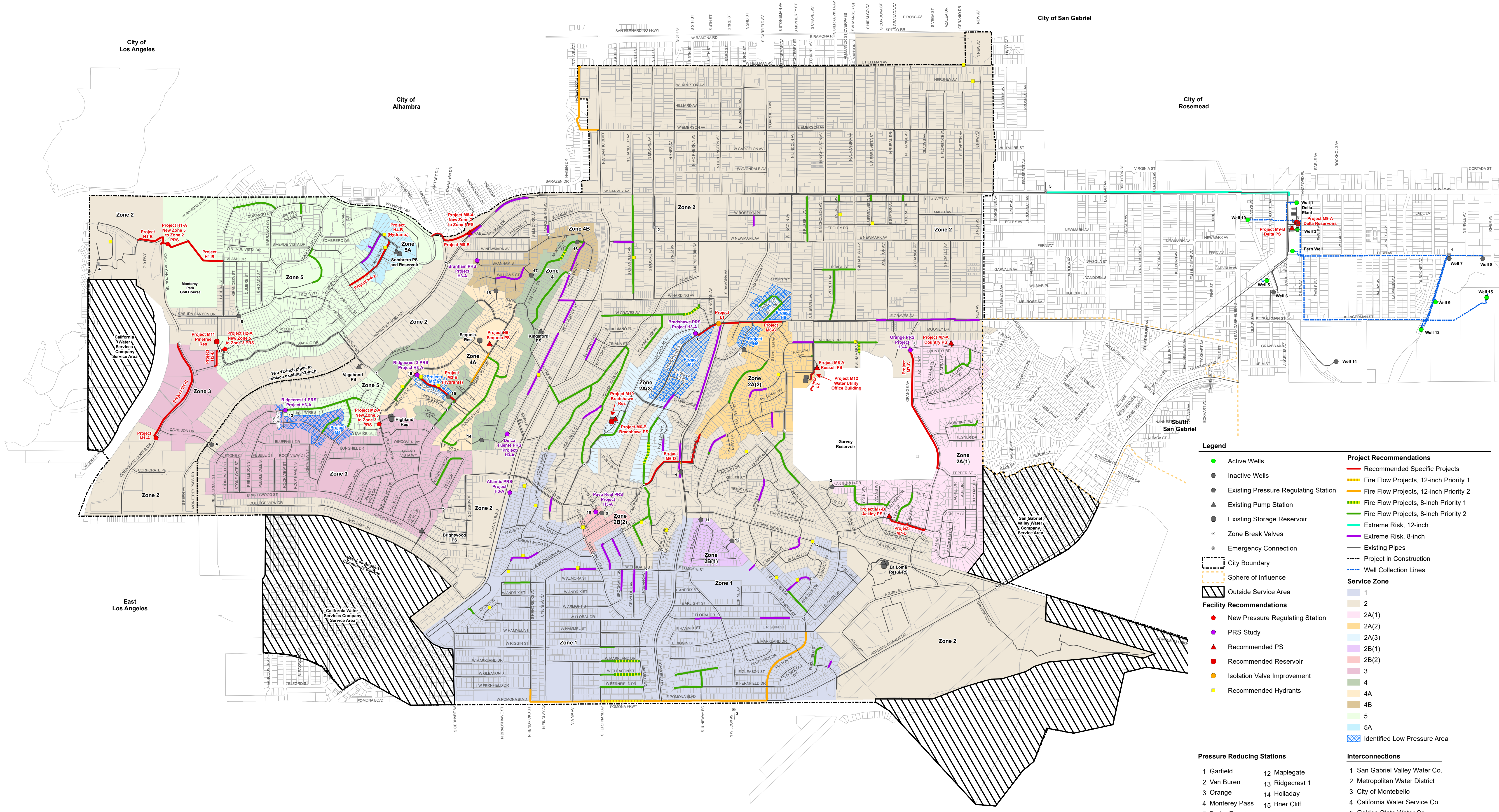
Priority	Project ID	Map ID	Justification	Type	Location / Address	Additional Project Information	Zone	Capacity (gpm)	Size (in)	Length (ft)	Facility Const. Cost	Facility Total Cost ¹	Pipe Constr. Cost	Pipe Total Cost ¹	Total Constr. Cost	Total Project Cost ¹	
Medium	M6	M6-A	Pumping Capacity and Fire Flow	Pump	Russell PS (Zone 2 to Zone 2A(2)), 750 S. Russell Ave	Replace Russell Booster Pump Station and Bradshawe Booster Pump Station. Remove hydropneumatic tanks, and install VFD operated pumps.	2A(2) & 2A(3)	Combined firm capacity of two stations to be 2,200 gpm	-	-	-	\$4,000,000	\$6,000,000	-	-	11,074,000	16,611,000
		M6-B		Pump	Bradshawe PS (Zone 2 to Zone 2A(3)), 1009 S. Bradshawe Ave				-	-	-	\$4,000,000	\$6,000,000	-	-		
		M6-C		Pipe	Graves Ave, between Lincoln Ave and Bradshawe Ave.				-	8	1,860	-	-	\$1,488,000	\$2,232,000		
		M6-D		Pipe	El Repeto Ave, between lasbella Ave and Lincoln Ave	-	8	1,920	-	-	\$1,536,000	\$2,304,000					
		M6-E		PDR	-	Develop a PDR to evaluate the improvements needed at Russell PS and Bradshawe PS. Conduct condition assessment of the pump station to identify any other upgrades.	2A(2) & 2A(3)	-	-	-	\$50,000	\$75,000	-	-			
Medium	M7	M7-A	Pump Station Capacity and Fire Flow	Pump Station	Country PS (Zone 2 to Zone 2A(1)), 901 Country Rd	Replace Country Booster Pump Station. Increase each pump to 800 gpm, with VFDs. Provide emergency power. Increase discharge pipe size.	2A(1)	Combined firm capacity of two stations to be 3,700 gpm	12	60	-	\$4,500,000	\$6,750,000	\$72,000	\$108,000	\$9,138,000	\$13,707,000
		M7-B		Pump Station	Ackley PS (Zone 2 to Zone 2A(1)), 567 Ackley St				Add VFDs at each of the existing pumps at Ackley. Use hydropneumatic tank as surge tank. Project H-9 includes providing emergency power to Ackley Pump Station	-	-	-	\$400,000	\$600,000	-		
		M7-C		Pipe	Orange Ave, between Country Rd and Pepper St	Provide fire flow to Hillcrest Elementary School (3,500 gpm)			-	12	2,660	-	-	\$3,192,000	\$4,788,000		
		M7-D		Pipe	Ackley St, between Tyler Dr and Orange Ave.	Provide fire flow to Hillcrest Elementary School (3,500 gpm)			-	12	770	-	-	\$924,000	\$1,386,000		
		M7-E		Evaluation	-	Develop a PDR to evaluate the fire flow requirements in the Zone 2A(1), specifically to Hillcrest Elementary School.			-	-	-	-	\$50,000	\$75,000	-		
Medium	M8	M8-A	Pump Station Capacity and Redundancy	Pump Station	New Booster PS from Zone 2 to Zone 5, Monterey Pass Road and Fremont Ave	Pump station to increase pumping capacity and to provide redundancy to Zone 5 and 5A.	5 & 5A	Firm capacity 4,000 gpm	-	-	-	\$4,000,000	\$6,000,000	-	-	5,454,000	8,181,000
		M8-B		Pipe	Garvey Ave and Monterey Pass Road				Discharge pipe to Zone 5.	-	12	1,170	-	-	\$1,404,000		
		M8-C		Evaluation	-	Develop a PDR to determine the location, capacity, and requirements of the proposed pump station			-	-	-	-	\$50,000	\$75,000	-		

Table 11-1 (Continued)
Capital Improvement Program

Priority	Project ID	Map ID	Justification	Type	Location / Address	Additional Project Information	Zone	Capacity (gpm)	Size (in)	Length (ft)	Facility Const. Cost	Facility Total Cost ¹	Pipe Constr. Cost	Pipe Total Cost ¹	Total Constr. Cost	Total Project Cost ¹
Medium	M9	M9-A	Condition	Reservoir	Delta Plant	Replace Delta Plant Settling Tanks. (2 tanks with 1MG capacity each).	1 & 2	-	-	-	\$8,000,000	\$12,000,000	-	-	\$16,000,000	\$24,000,000
		M9-B		Pump Station		Replace Delta Booster Pump Station to Zone 1 and Zone 2. (2012 Water Master Plan Recommendation)		-	-	-	\$8,000,000	\$12,000,000	-	-		
Medium	M10	M10	Condition	Reservoir	Bradshawe Reservoir	Replace Bradshawe Reservoir 3, due to condition and age. (2012 Water Master Plan Recommendation)	2	-	-	-	\$3,500,000	\$5,250,000	-	-	3,500,000	5,250,000
Medium	M11	M11	Condition	Reservoir	Pinetree Reservoir	Replace Pinetree Reservoir, if a solution is not found to remedy the separation between the floor plate and the ringwall connection. (2012 Water Master Plan Recommendation)	2	-	-	-	\$6,000,000	\$9,000,000	-	-	6,000,000	9,000,000
Medium	M12	M12	Condition	Office	Water Utility Office Building	Water Utility Office Building Upgrades, near Garvey Reservoir. (2012 Water Master Plan Recommendation)	-	-	-	-	\$1,500,000	\$2,250,000	-	-	1,500,000	2,250,000
Medium	M13	-	Pressure Monitoring	Pipe	High pressure areas.	Monitor condition of old pipes in high pressure areas. Estimate based on purchasing 30 Syrinix sensors that collect pressure transient and acoustic leak detection data. Installation, hydraulic analyses, and training services are also included in the estimate.	-	-	-	-	\$125,000	\$187,500	-	-	\$125,000	\$187,500
Medium	M14	-	SCADA	SCADA	Pump Stations	Upgrade SCADA System. Brightwood PS, Kingsford PS, Ackley PS, Bradshawe PS, and Russell PS flows to be connected to SCADA system. (2012 Water Master Plan)	-	-	-	-	\$1,000,000	\$1,500,000	-	-	\$4,150,000	\$6,225,000
				PRs	Connect all PRs to SCADA system.	\$3,150,000					\$4,725,000					
Low	L1	L1	Operations	Valve	Grandridge Av, west of Garfield Av	Replace the existing inoperable isolation valve on the 18-inch pipe in Zone 2.	2	-	-	-	\$150,000	\$225,000	-	-	\$150,000	\$225,000
Low	L2	L2	Redundancy	Pipe	Russell Av, South of Ransom Way	There is a single 12-inch pipe between the Russell PS and the Russell Reservoirs. A parallel system should be constructed for redundancy.	2	-	12	260	-	-	\$312,000	\$468,000	\$312,000	\$468,000
Low	L3	-	Condition	Wells	Wells 1, 3, 9, 10 and 12	Five wells have exceeded their useful lives. The City has not identified any current problems with the wells. For planning purposes, 2 wells are recommended for replacement in the event that problems arise in the future.	-	-	-	-	\$6,000,000	\$9,000,000	-	-	6,000,000	9,000,000

Table 11-1 (Continued)
Capital Improvement Program

Priority	Project ID	Map ID	Justification	Type	Location / Address	Additional Project Information	Zone	Capacity (gpm)	Size (in)	Length (ft)	Facility Const. Cost	Facility Total Cost ¹	Pipe Constr. Cost	Pipe Total Cost ¹	Total Constr. Cost	Total Project Cost ¹
Fire Flow	-	-	Fire Flow	Pipe	-	Fire flow pipe improvements with risk category "Extreme"	-	-	12	910	-	-	\$1,092,000	\$1,638,000	\$1,092,000	\$1,638,000
Fire Flow	-	-	Fire Flow	Pipe	-	Fire flow pipe improvements with risk category "High," "Medium," "Low," or "Negligible"	-	-	12	8,570	-	-	\$10,284,000	\$15,426,000	\$10,284,000	\$15,426,000
Fire Flow	-	-	Fire Flow	Pipe	-	Fire flow pipe improvements with risk category "Extreme"	-	-	8	2,480	-	-	\$1,984,000	\$2,976,000	\$1,984,000	\$2,976,000
Fire Flow	-	-	Fire Flow	Pipe	-	Fire flow pipe improvements with risk category "High," "Medium," "Low," or "Negligible"	-	-	8	45,250	-	-	\$36,200,000	\$54,300,000	\$36,200,000	\$54,300,000
Hydrant	-	-	Fire Flow	Hydrants	-	23 Hydrants	-	-	-	-	\$575,000	\$862,500			575,000	862,500
Risk	-	-	Risk	Pipe	-	12" Pipe Replacement	-	-	12	5,130	-	-	\$6,156,000	\$9,234,000	\$6,156,000	\$9,234,000
Risk	-	-	Risk	Pipe	-	8" Pipe Replacement	-	-	8	21,170	-	-	\$16,936,000	\$25,404,000	\$16,936,000	\$25,404,000
									Total	99,570	\$78,250,000	\$117,300,000	\$89,760,000	\$134,640,000	\$167,360,000	\$250,965,000



Legend

- Active Wells
- Inactive Wells
- Existing Pressure Regulating Station
- Existing Pump Station
- Existing Storage Reservoir
- Zone Break Valves
- Emergency Connection
- City Boundary
- Sphere of Influence
- Outside Service Area
- New Pressure Regulating Station
- PRS Study
- Recommended PS
- Recommended Reservoir
- Isolation Valve Improvement
- Recommended Hydrants

Project Recommendations

- Recommended Specific Projects
- Fire Flow Projects, 12-inch Priority 1
- Fire Flow Projects, 12-inch Priority 2
- Fire Flow Projects, 8-inch Priority 1
- Fire Flow Projects, 8-inch Priority 2
- Extreme Risk, 12-inch
- Extreme Risk, 8-inch
- Existing Pipes
- Project in Construction
- Well Collection Lines

Service Zone

- 1
- 2
- 2A(1)
- 2A(2)
- 2A(3)
- 2B(1)
- 2B(2)
- 3
- 4
- 4A
- 4B
- 5
- 5A
- Identified Low Pressure Area

Facility Recommendations

- New Pressure Regulating Station
- PRS Study
- Recommended PS
- Recommended Reservoir
- Isolation Valve Improvement
- Recommended Hydrants

Pressure Reducing Stations

1 Garfield	12 Maplegate
2 Van Buren	13 Ridgecrest 1
3 Orange	14 Holladay
4 Monterey Pass	15 Brier Cliff
5 De La Fuente	16 Kingsford
6 Casuda Canyon	17 Jade Tree
7 Diane Way	18 Tedford
8 Bradshaw	19 Ridgecrest 2
9 Grandridge	20 Atlantic
10 Wilcox	21 Branham
11 Pavo Real	

Interconnections

1 San Gabriel Valley Water Co.
2 Metropolitan Water District
3 City of Montebello
4 California Water Service Co.
5 Golden State Water Co.

0 450 900 1,800 Feet

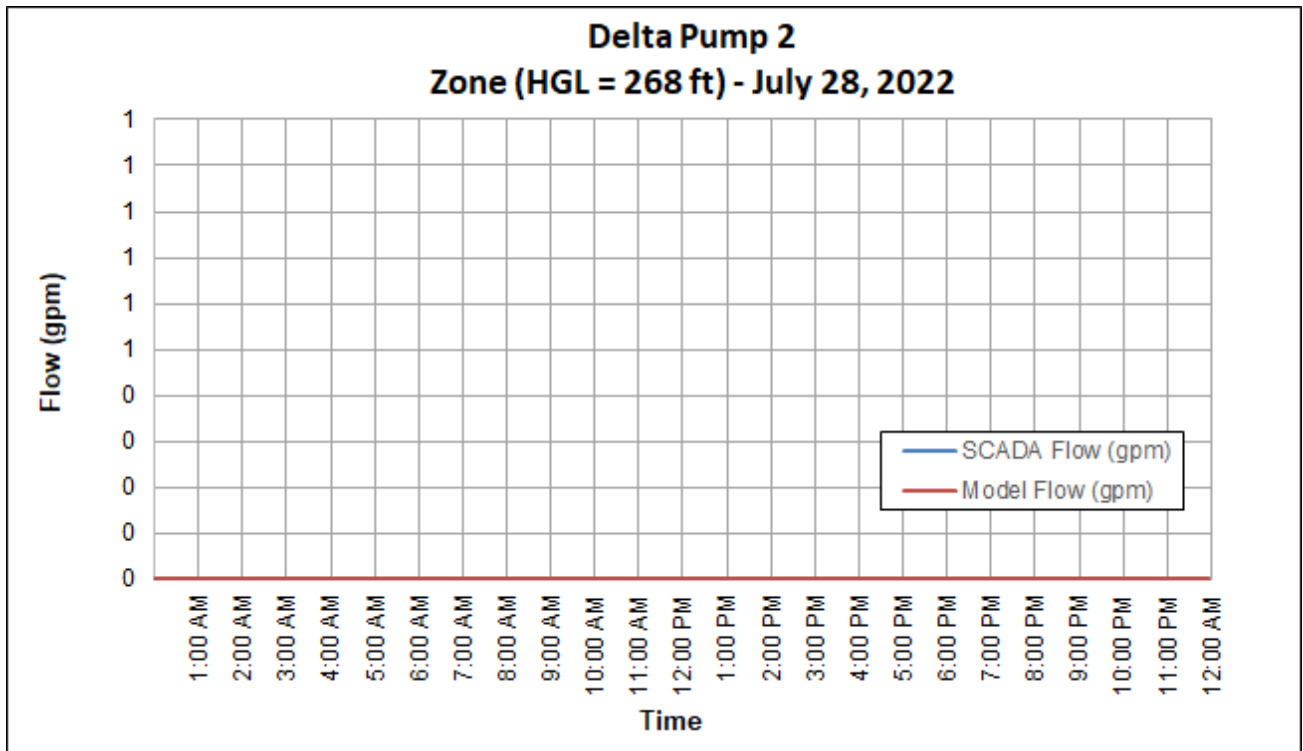
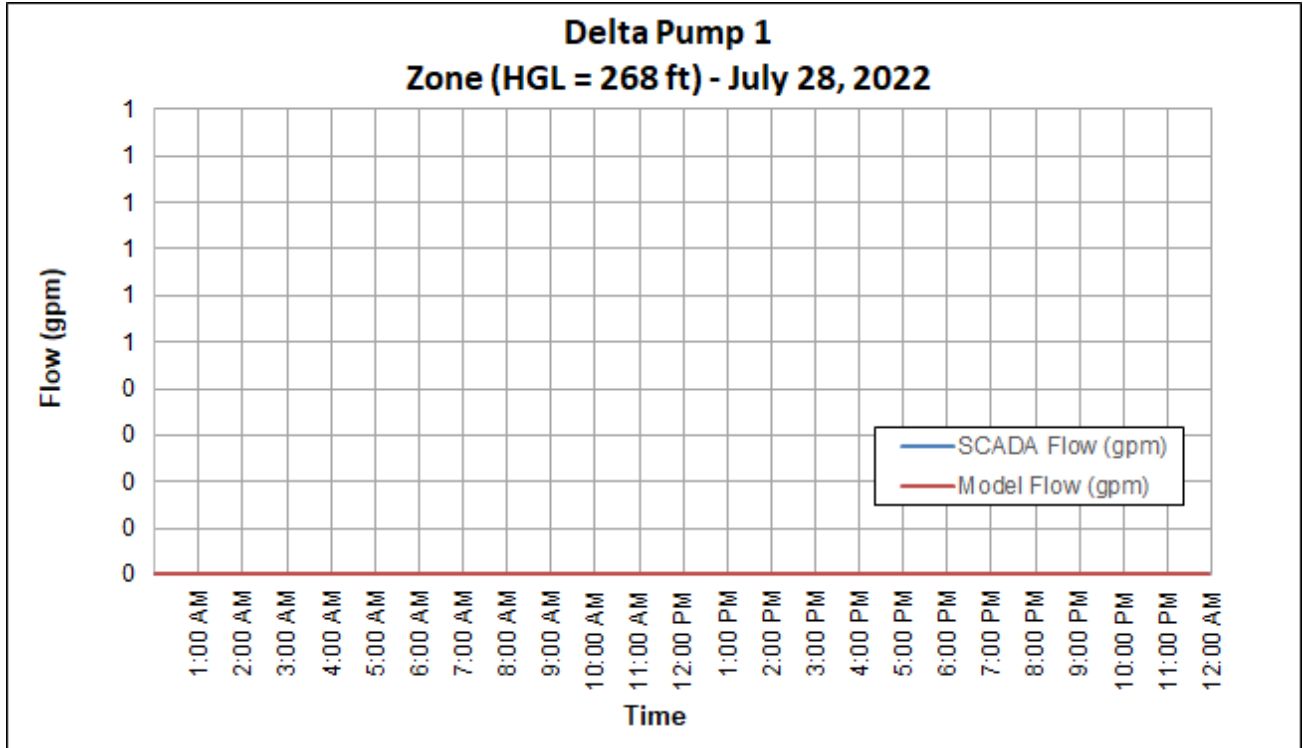
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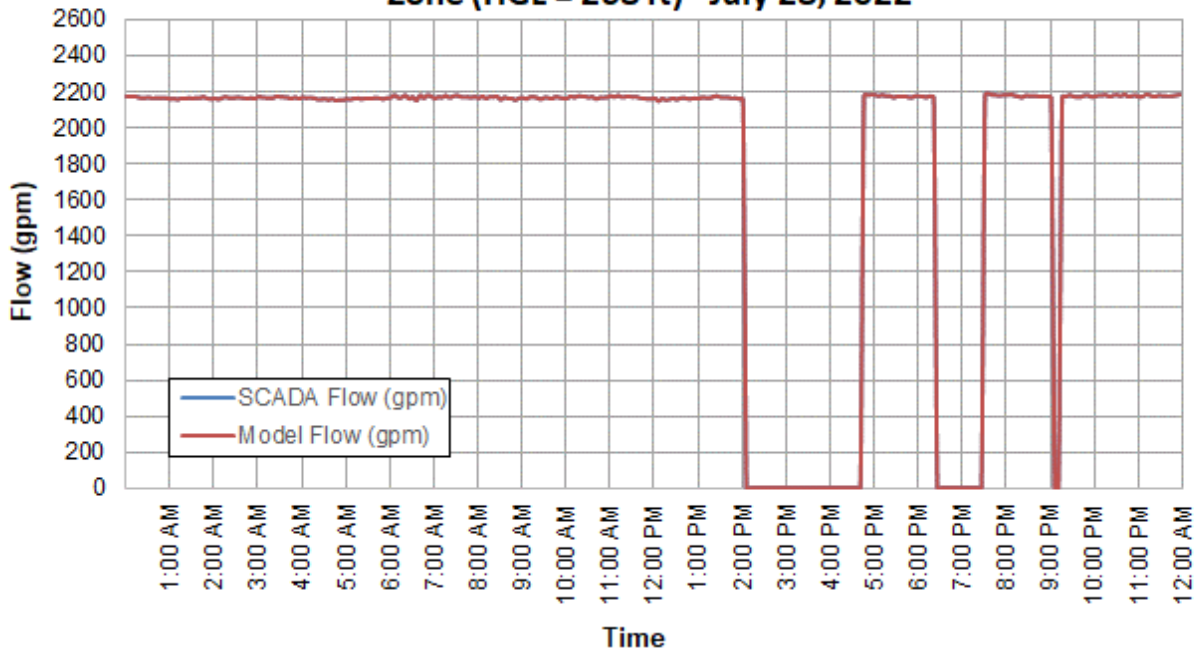
APPENDIX 8-1

BOOSTER PUMP FLOWS DURING CALIBRATION PERIOD

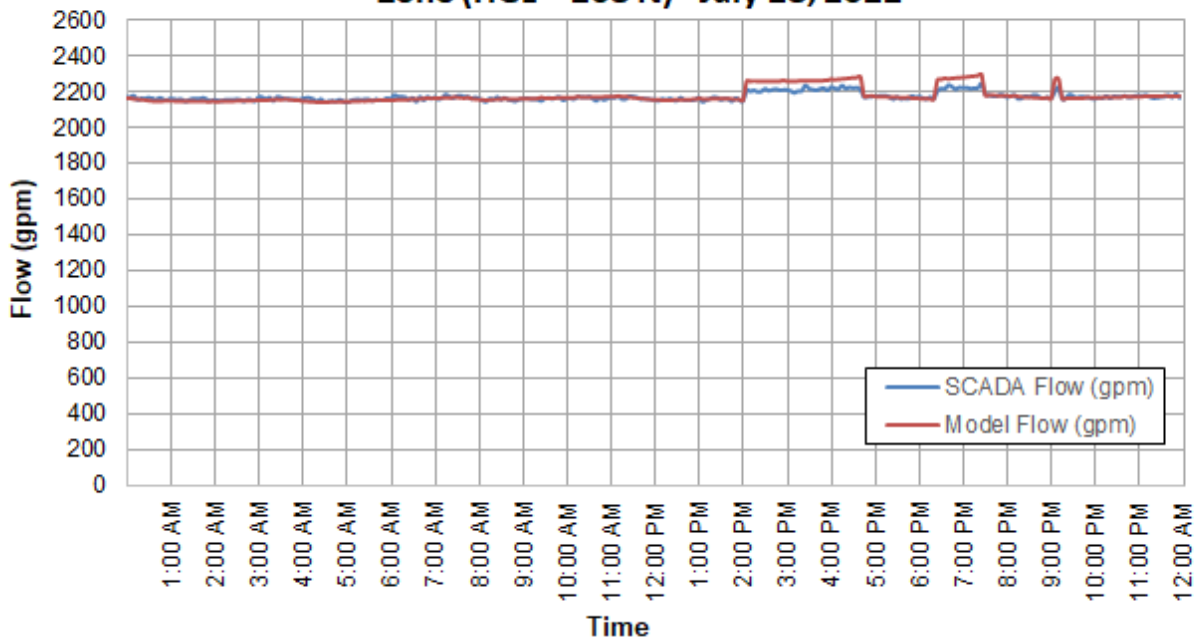
DELTA BOOSTER PUMPS



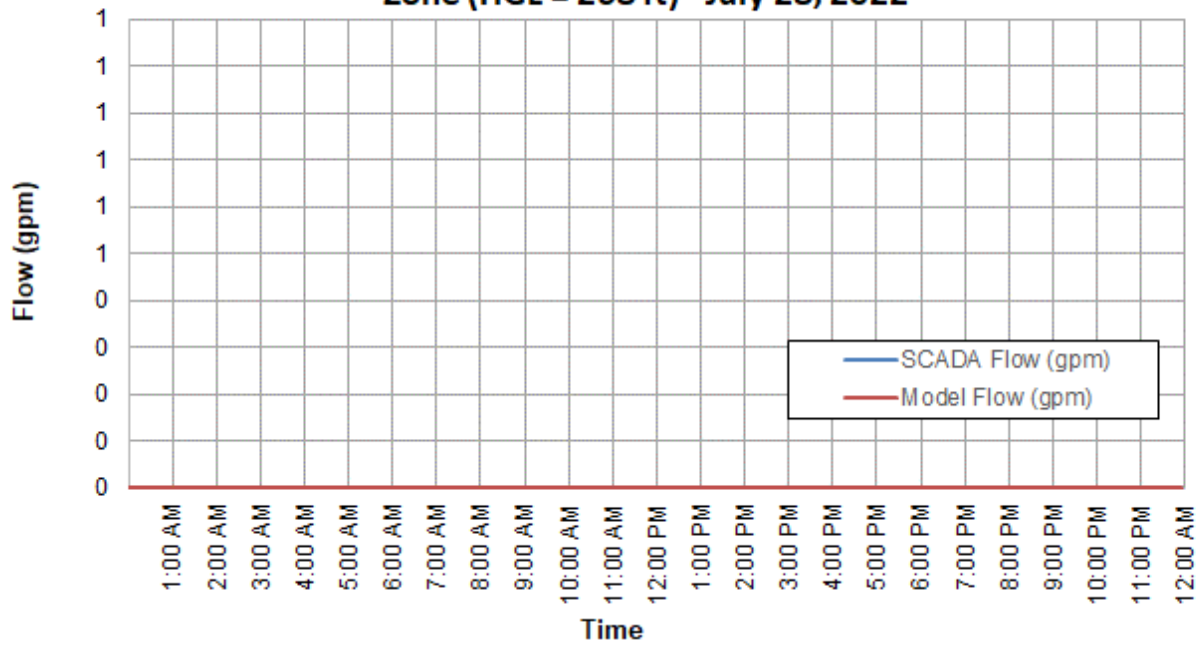
Delta Pump 3
Zone (HGL = 268 ft) - July 28, 2022



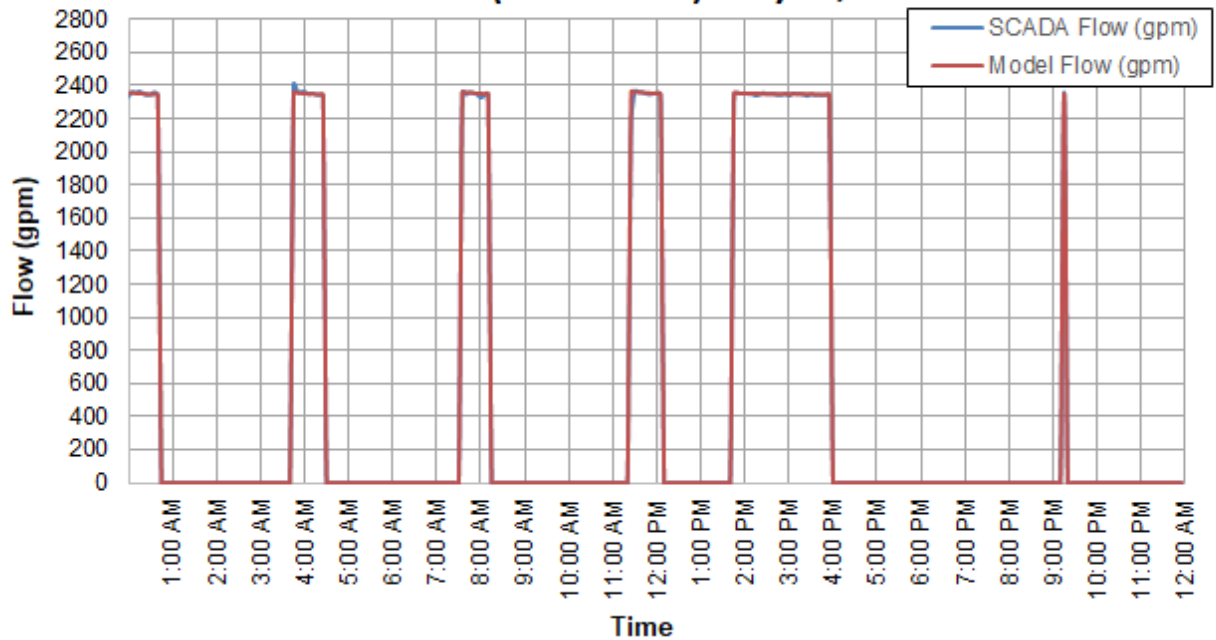
Delta Pump 4
Zone (HGL = 268 ft) - July 28, 2022



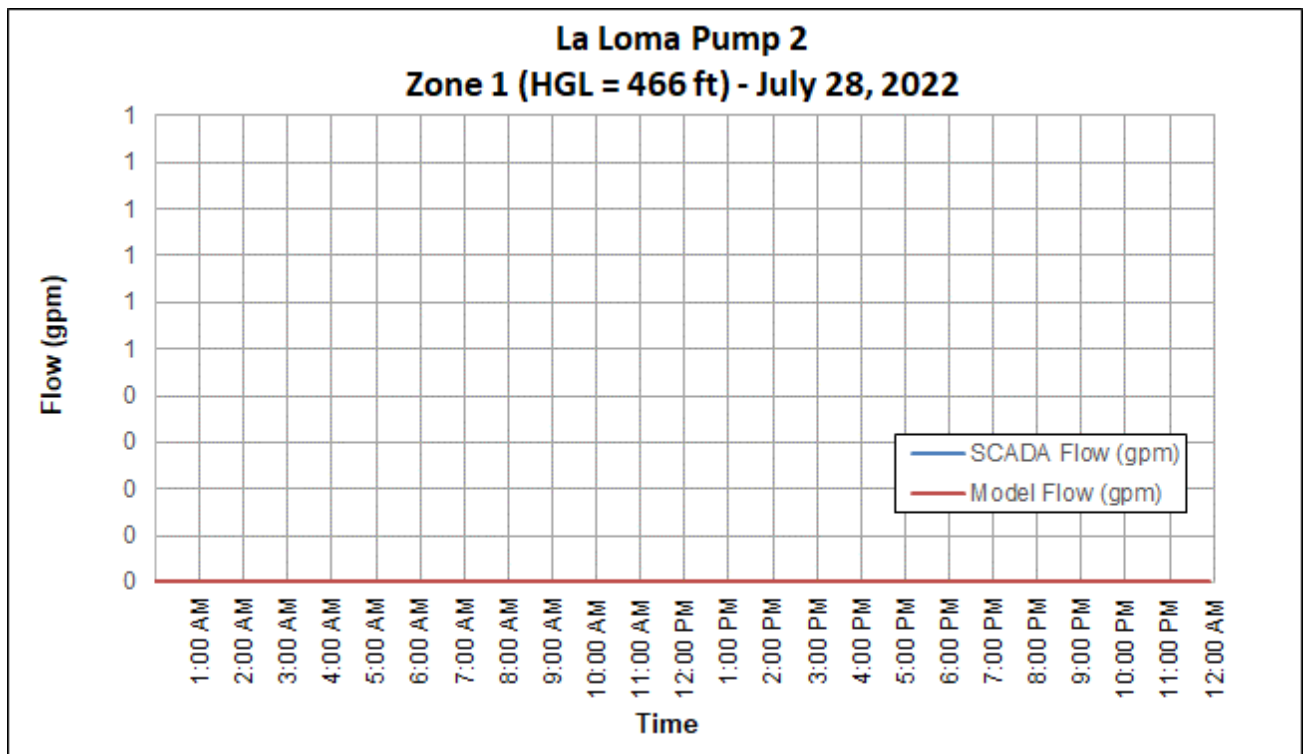
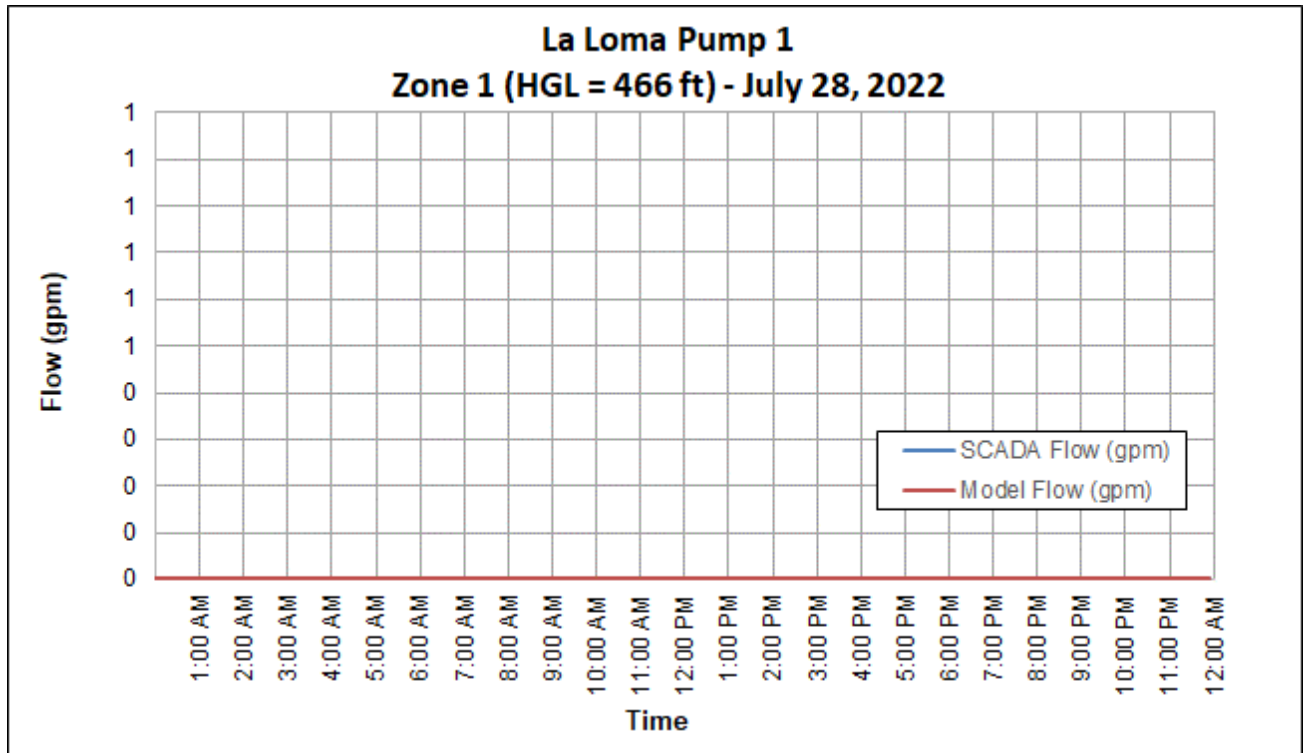
Delta Pump 5
Zone (HGL = 268 ft) - July 28, 2022

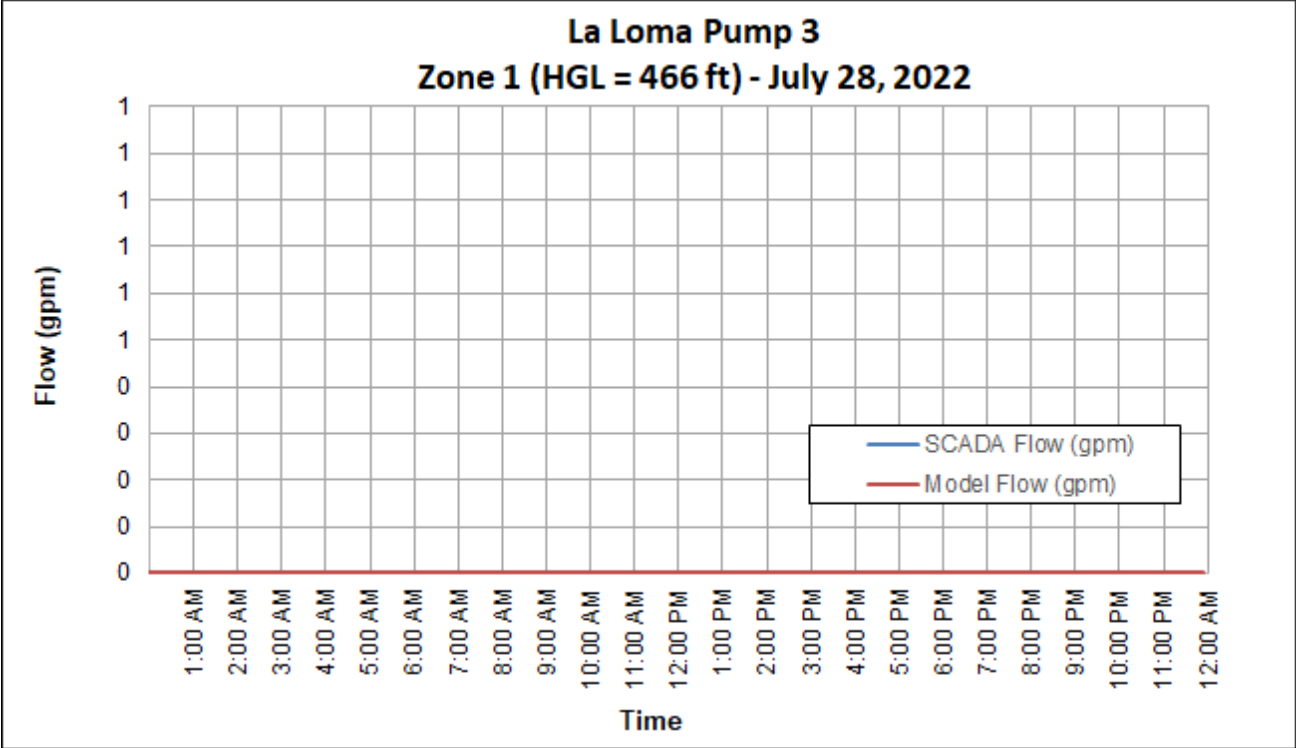


Delta Pump 6
Zone (HGL = 268 ft) - July 28, 2022

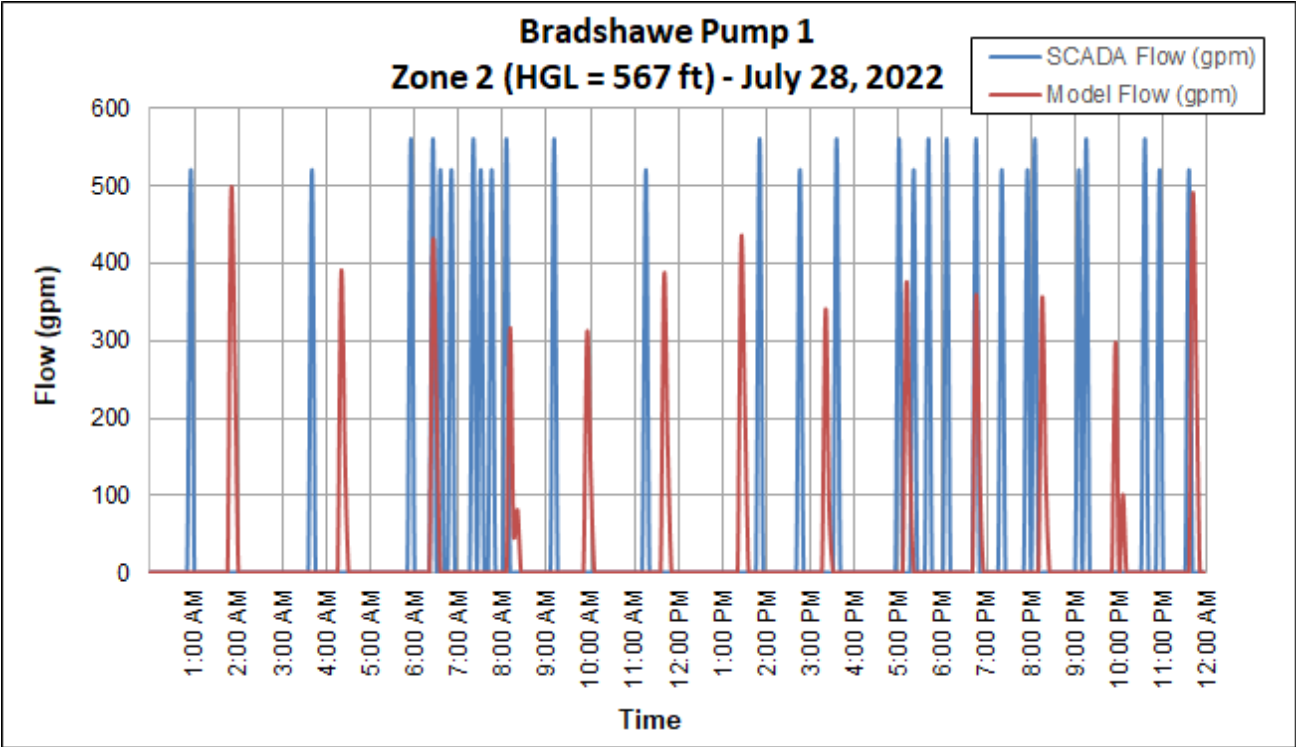


ZONE 1 BOOSTER PUMPS

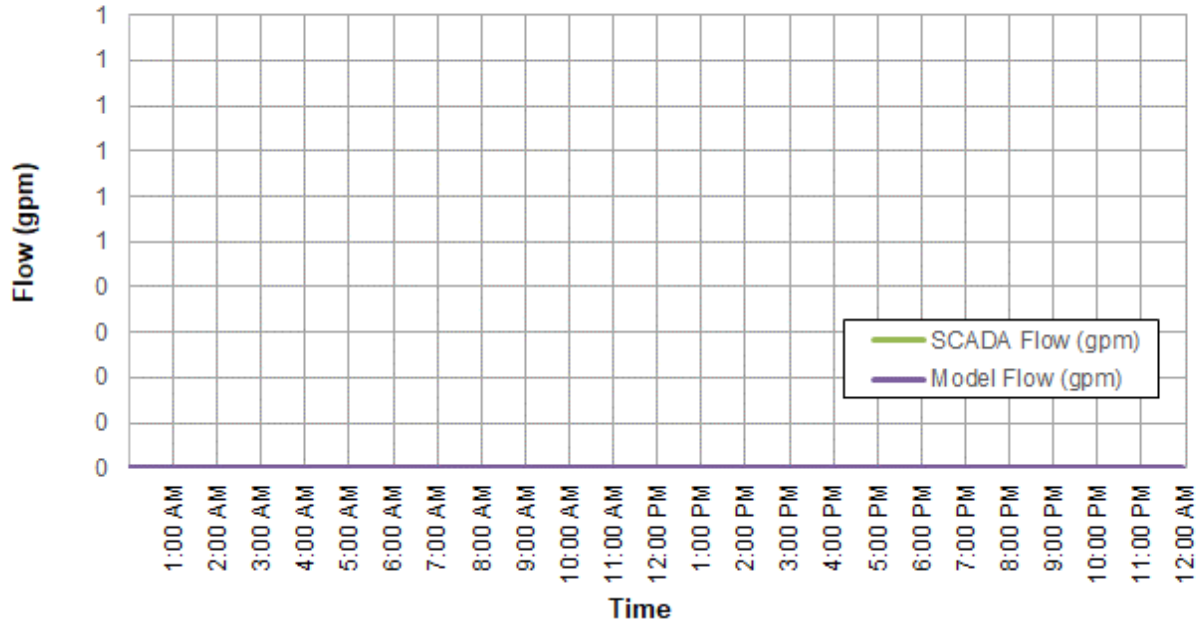




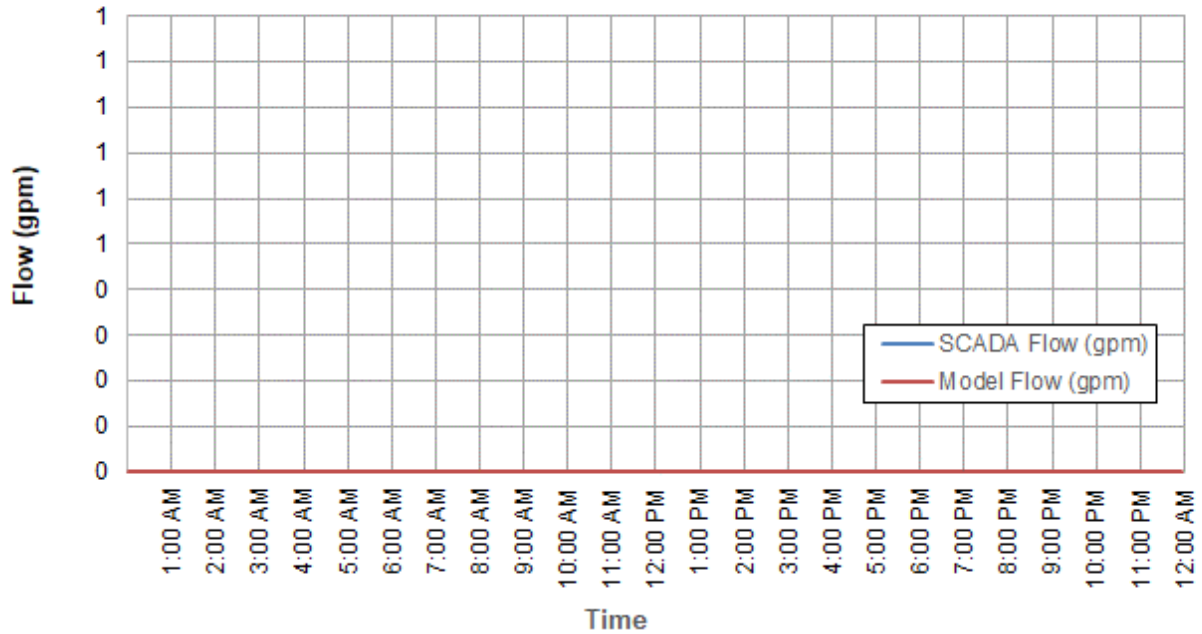
ZONE 2 BOOSTER PUMPS



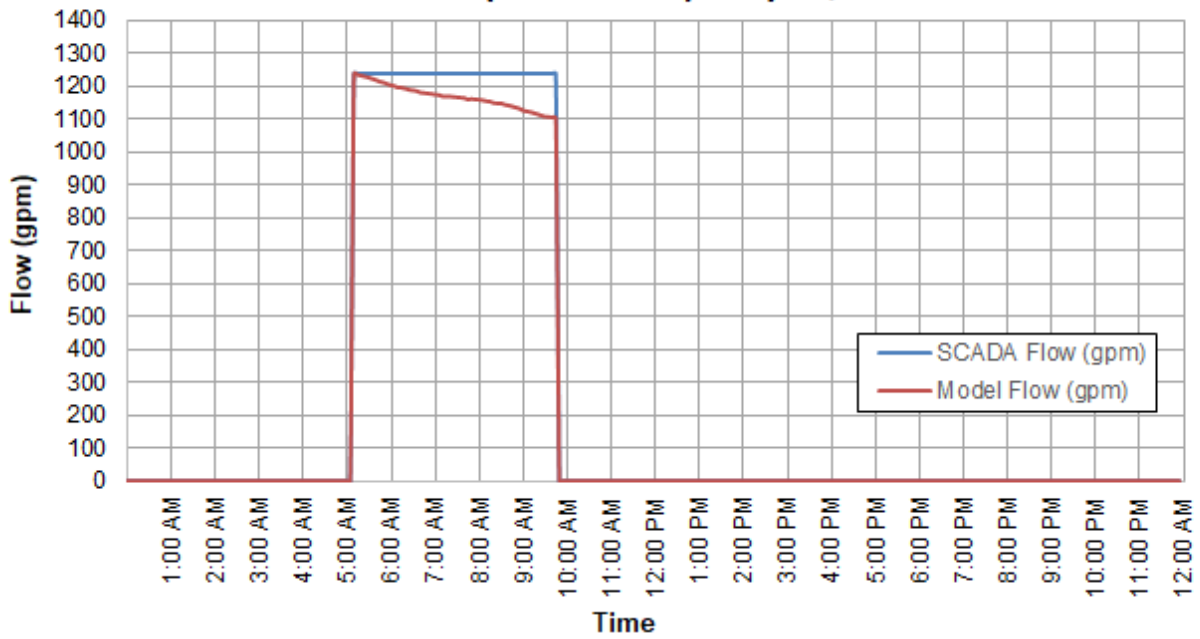
Bradshawe Pump 2
Zone 2 (HGL = 567 ft) - July 28, 2022



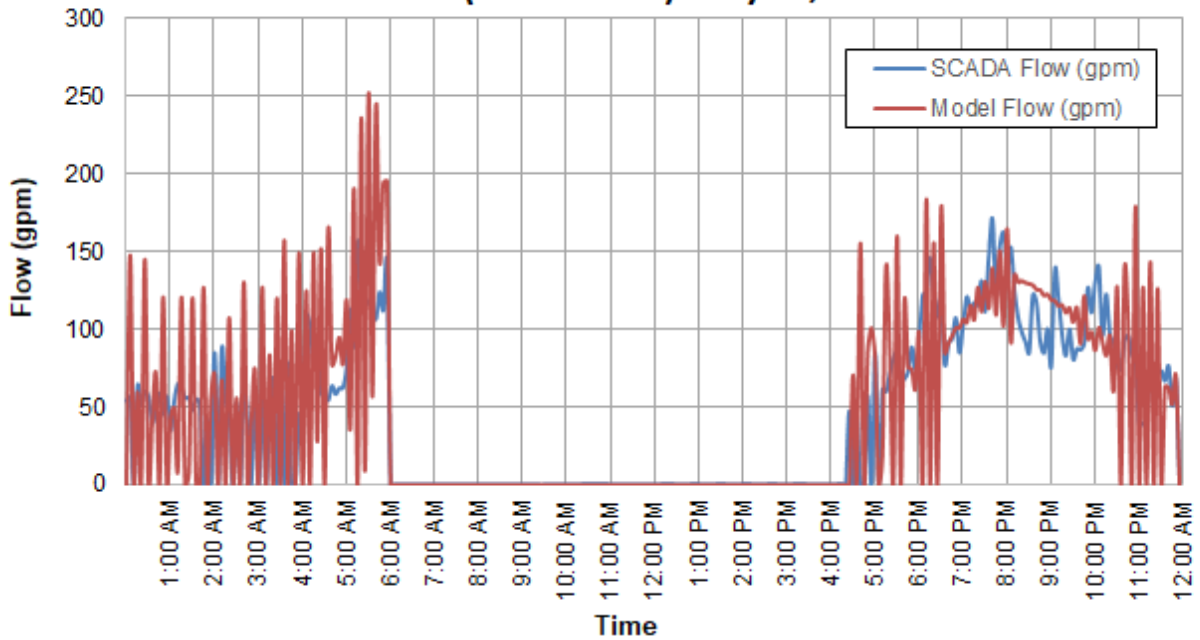
Brightwood Pump 1
Zone 2 (HGL = 567 ft) - July 28, 2022



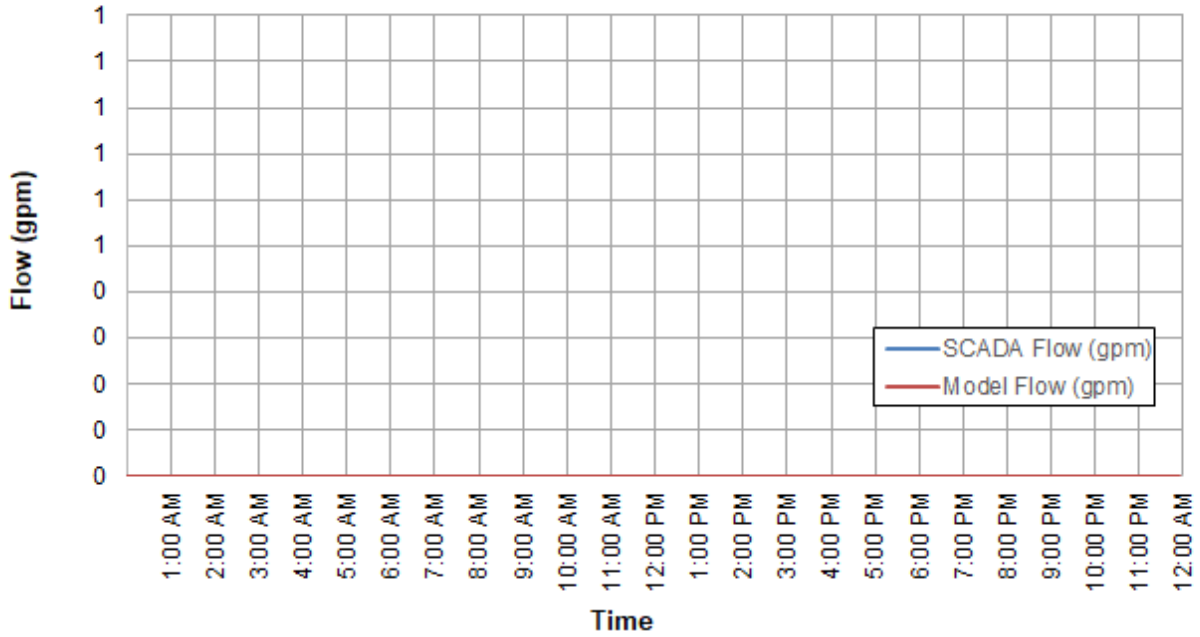
Brightwood Pump 2
Zone 2 (HGL = 567 ft) - July 28, 2022



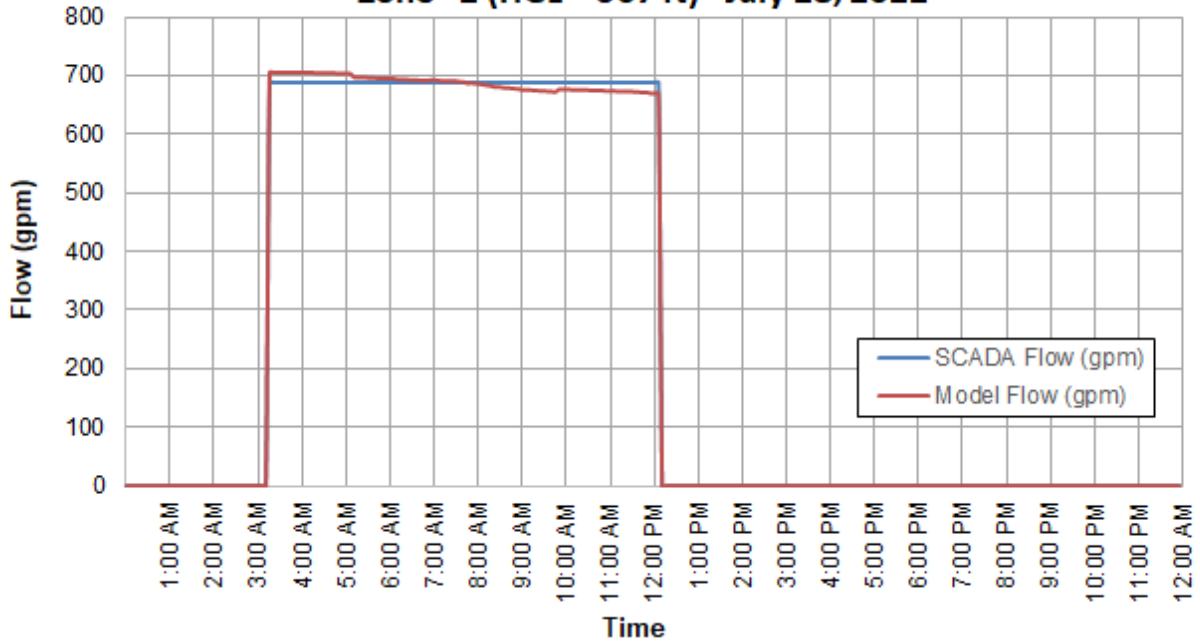
Country Pump 1
Zone 2 (HGL = 567 ft) - July 28, 2022

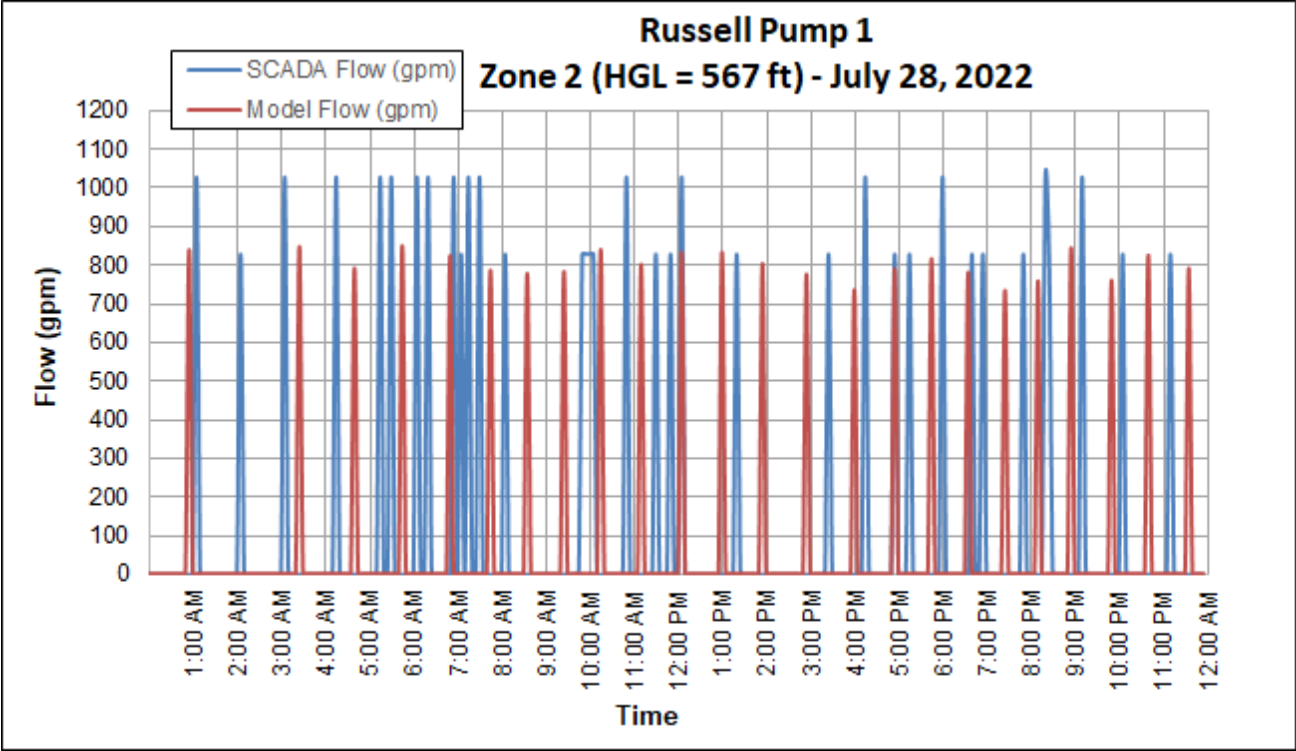
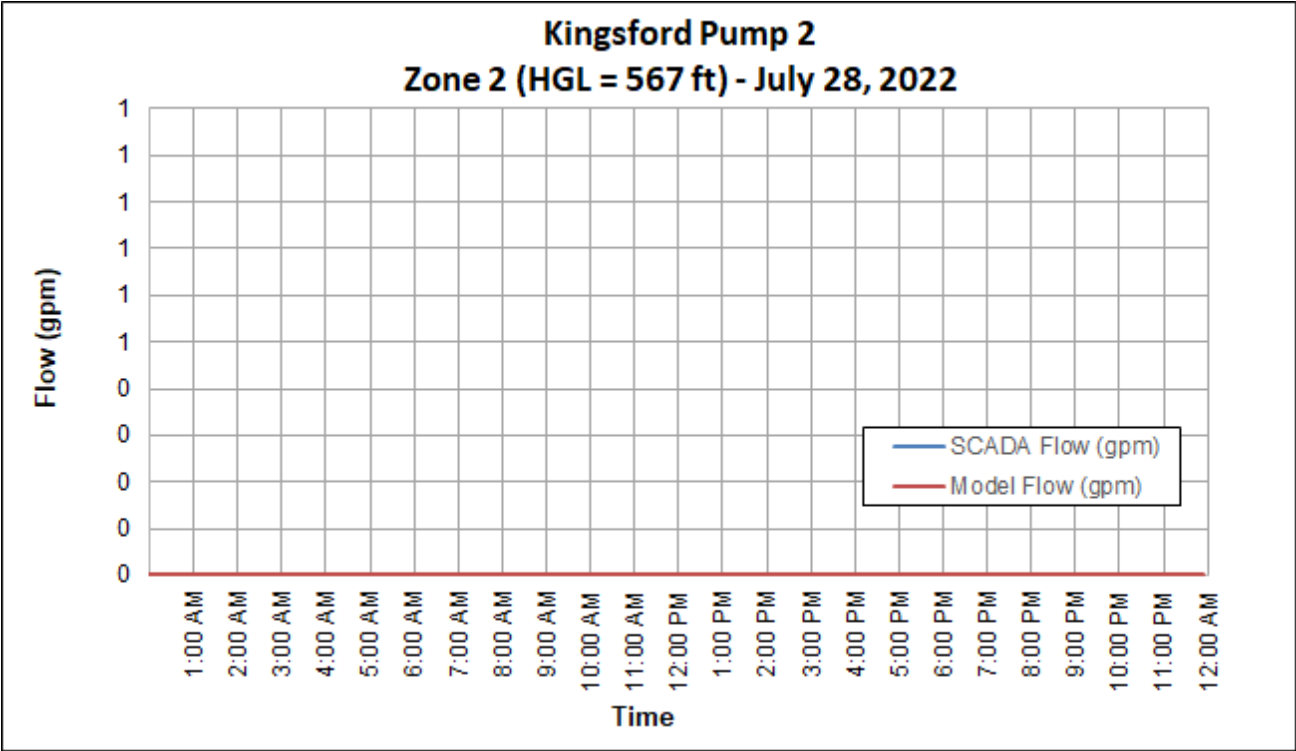


Country Pump 2
Zone 2 (HGL = 567 ft) - July 28, 2022

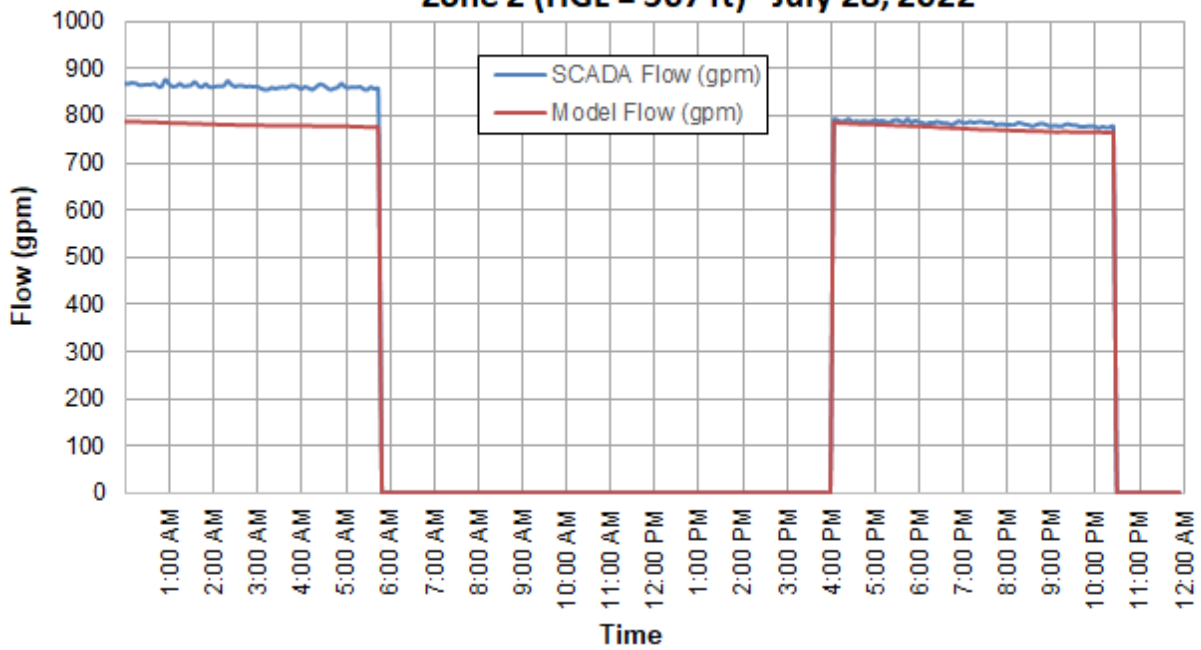


Kingsford Pump 1
Zone =2 (HGL = 567 ft) - July 28, 2022

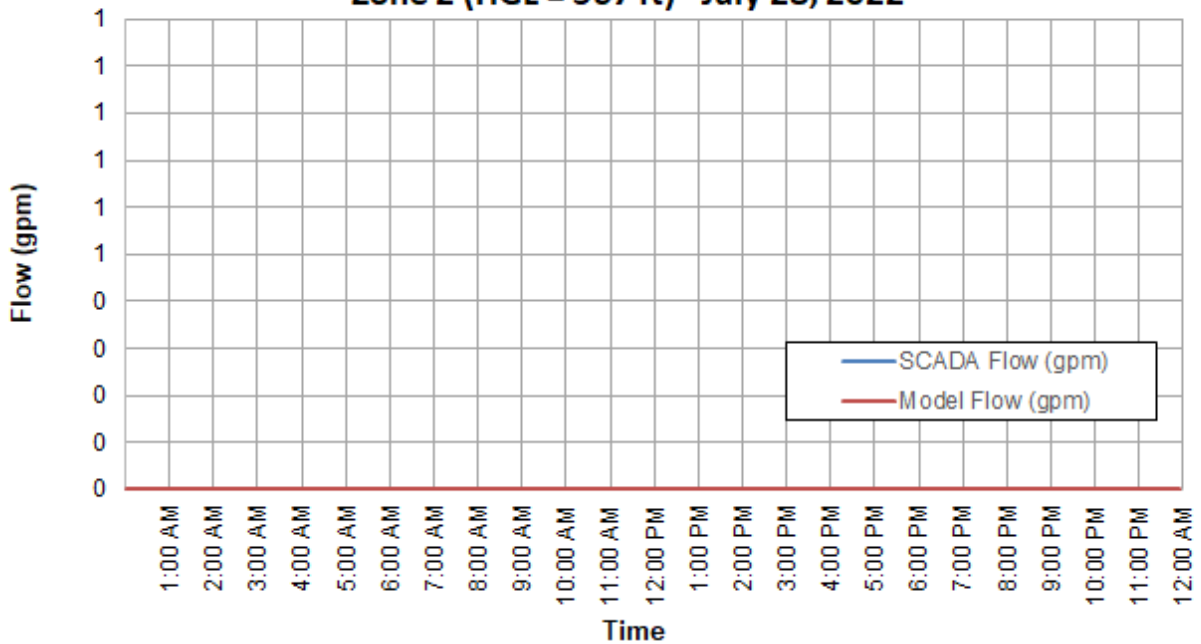


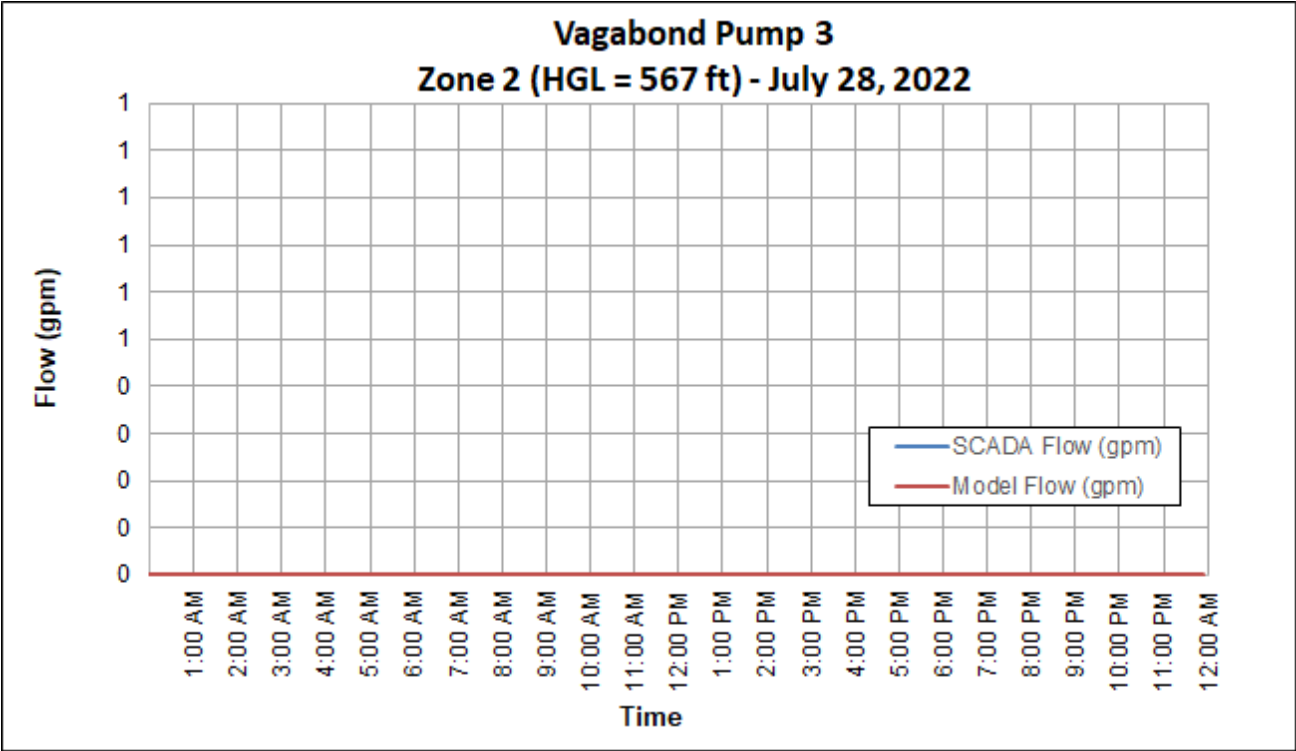


Vagabond Pump 1
Zone 2 (HGL = 567 ft) - July 28, 2022

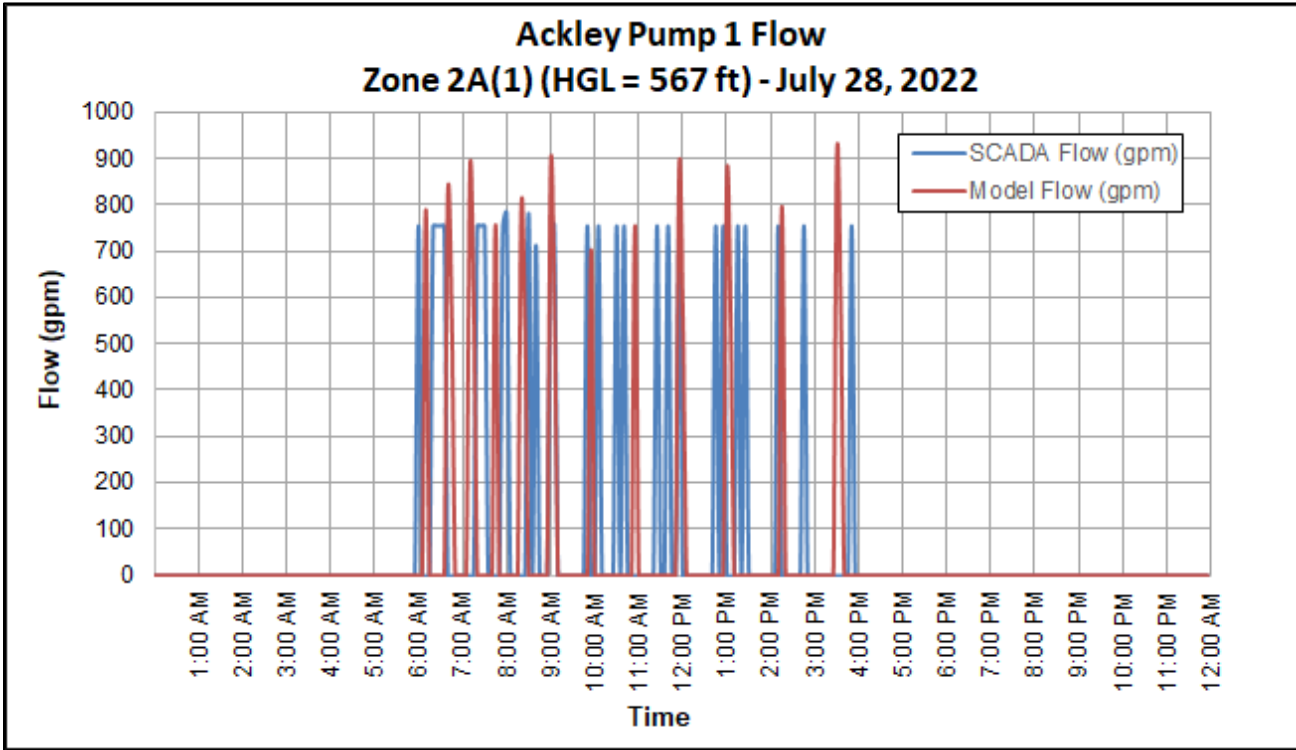


Vagabond Pump 2
Zone 2 (HGL = 567 ft) - July 28, 2022

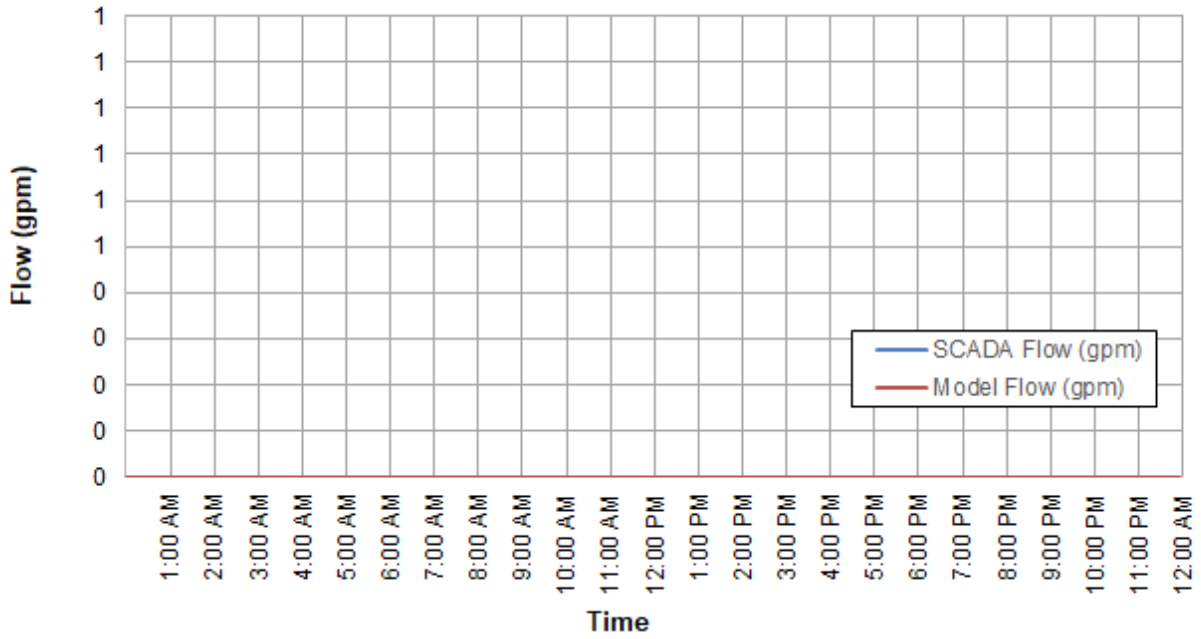




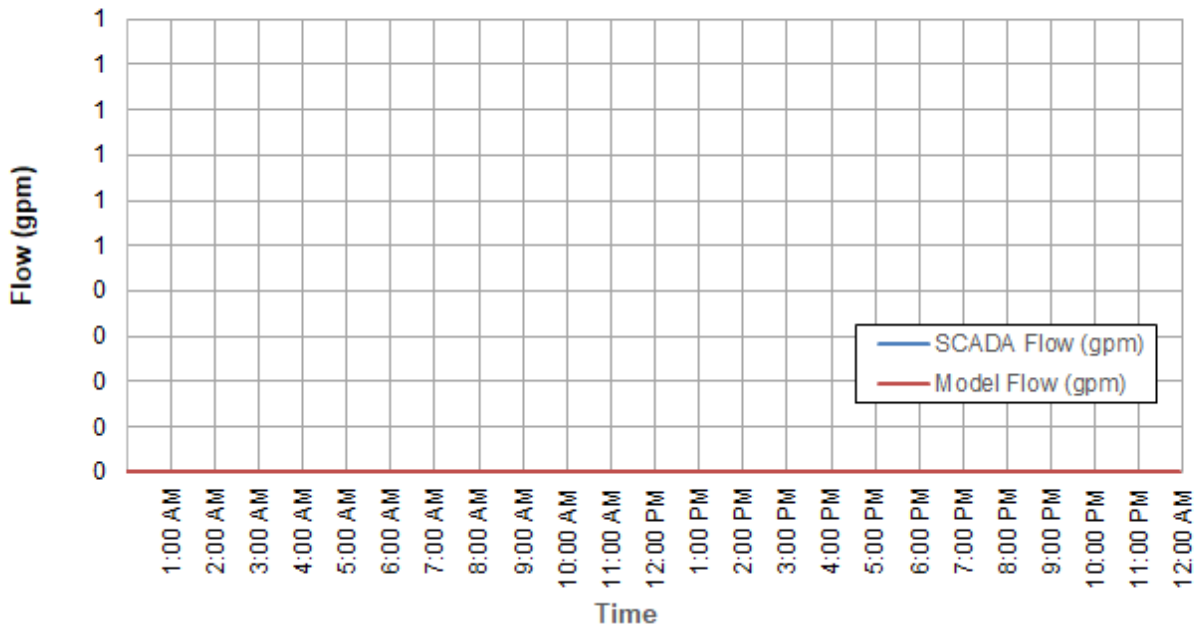
ZONE 2A(1) BOOSTER PUMPS



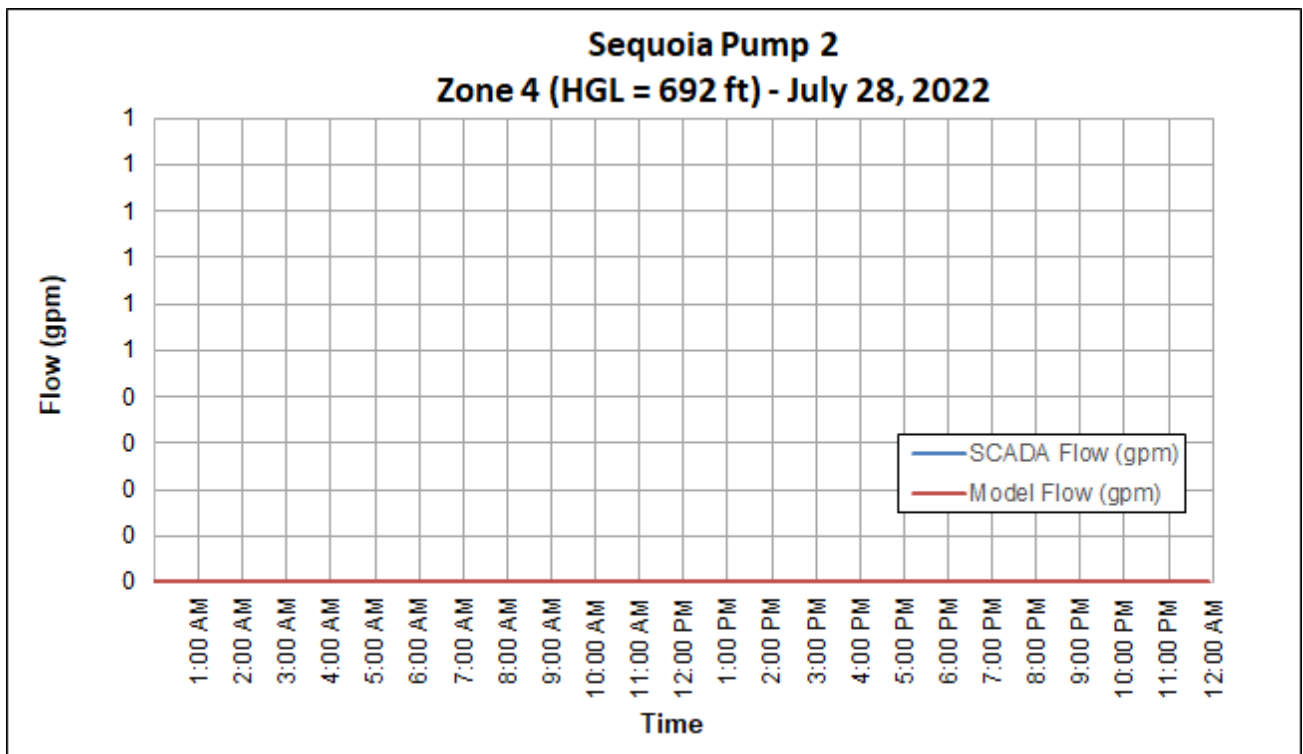
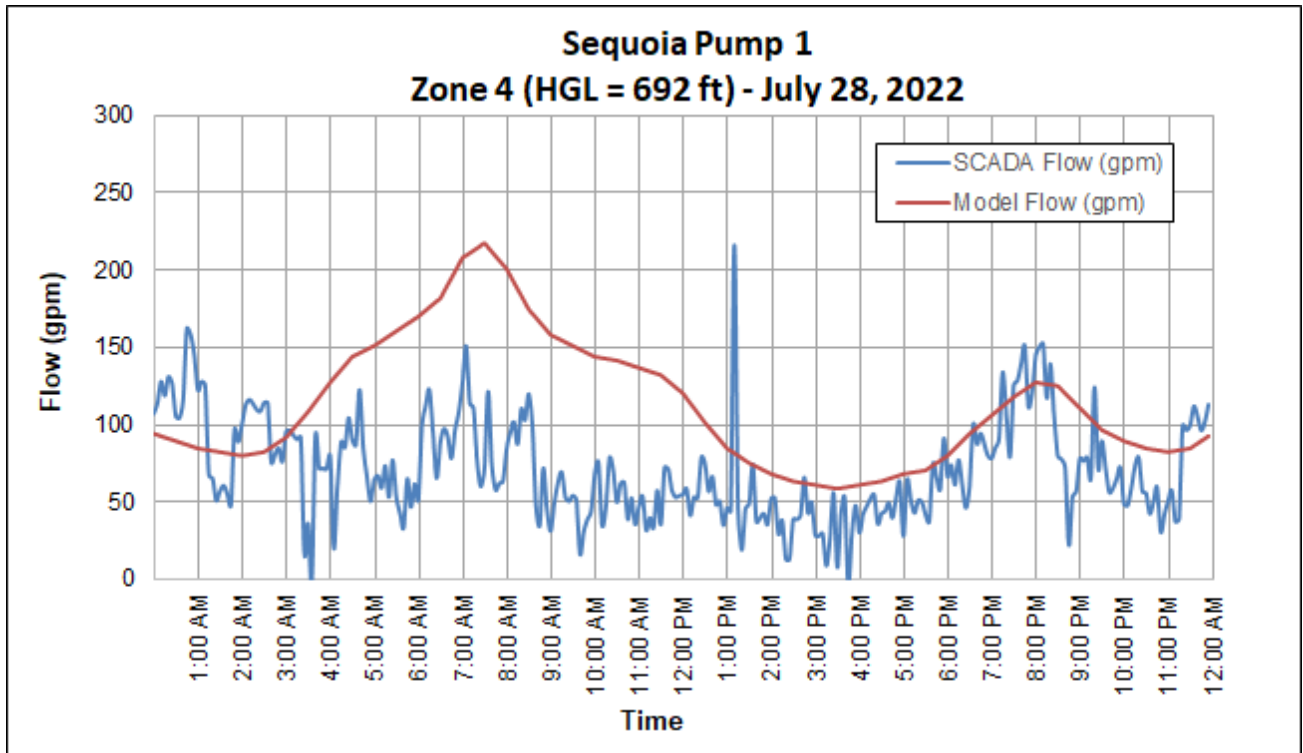
Ackley Pump 2 Flow
Zone 2A(1) (HGL = 567 ft) - July 28, 2022

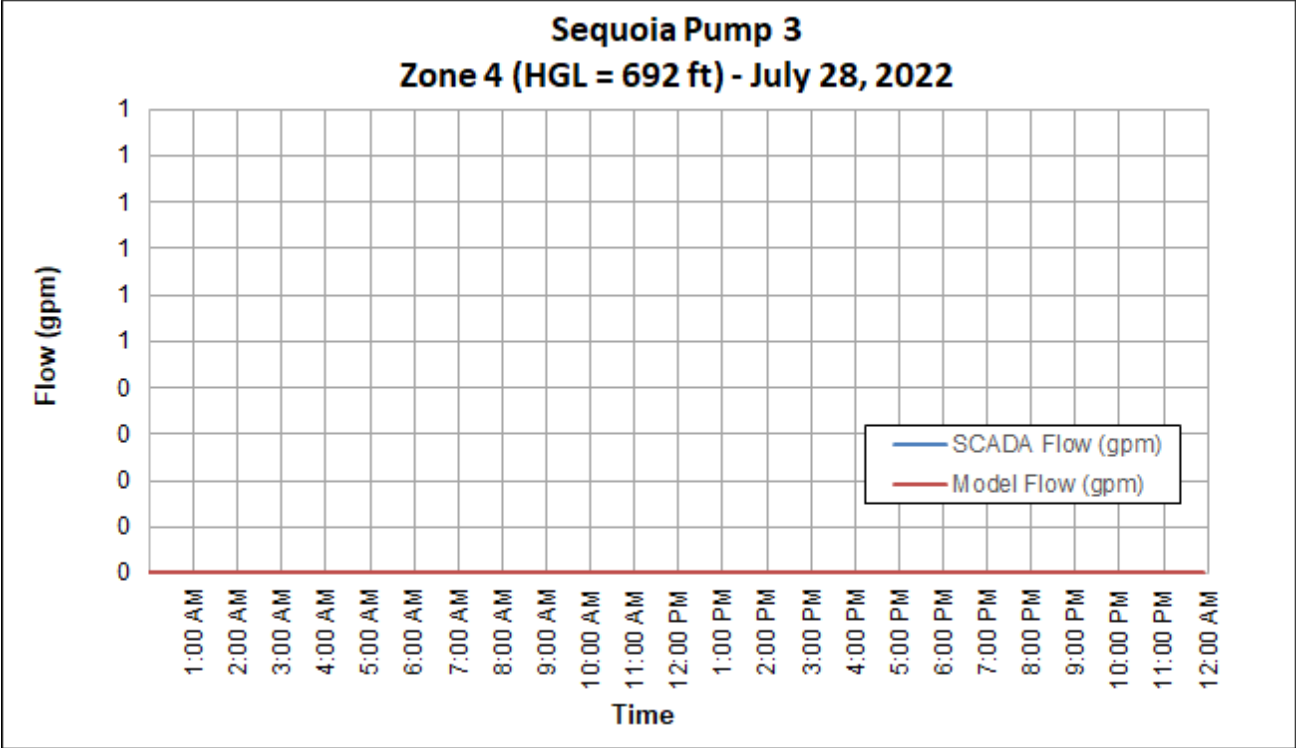


Ackley Pump 3 Flow
Zone 2A(1) (HGL = 567 ft) - July 28, 2022

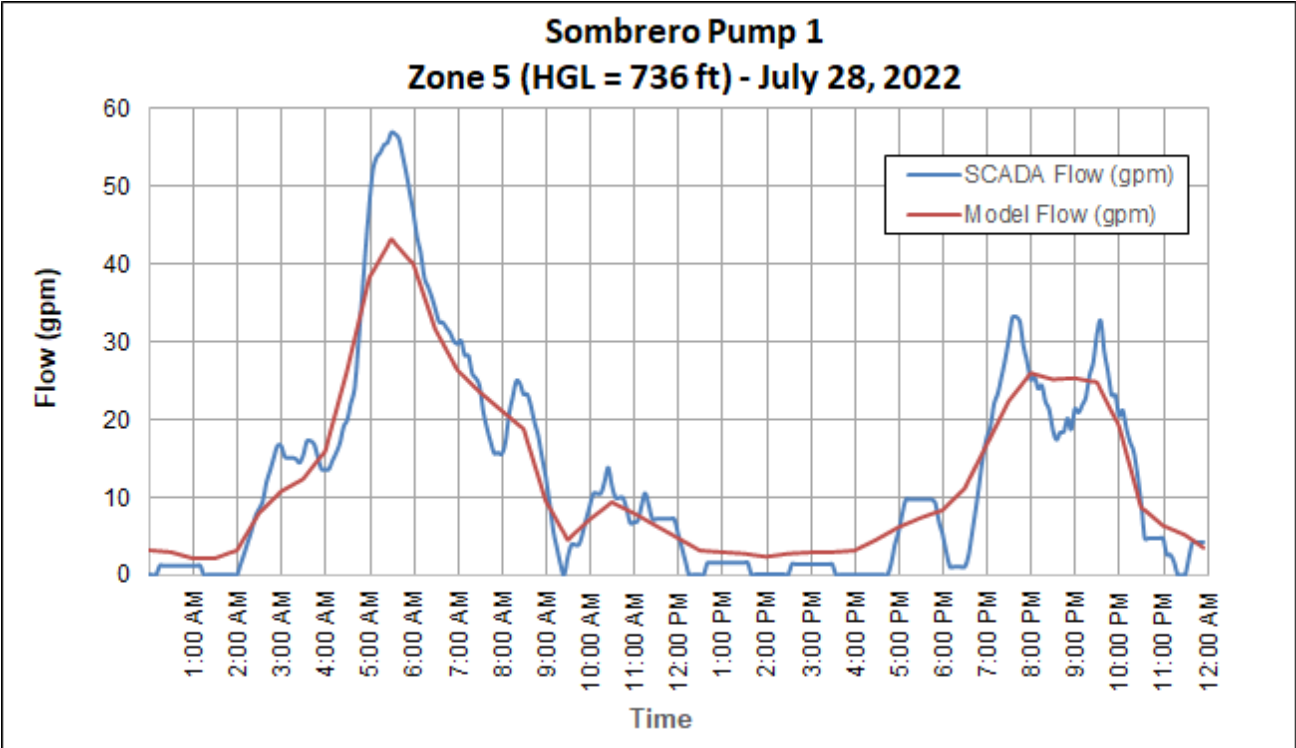


ZONE 4 BOOSTER PUMPS

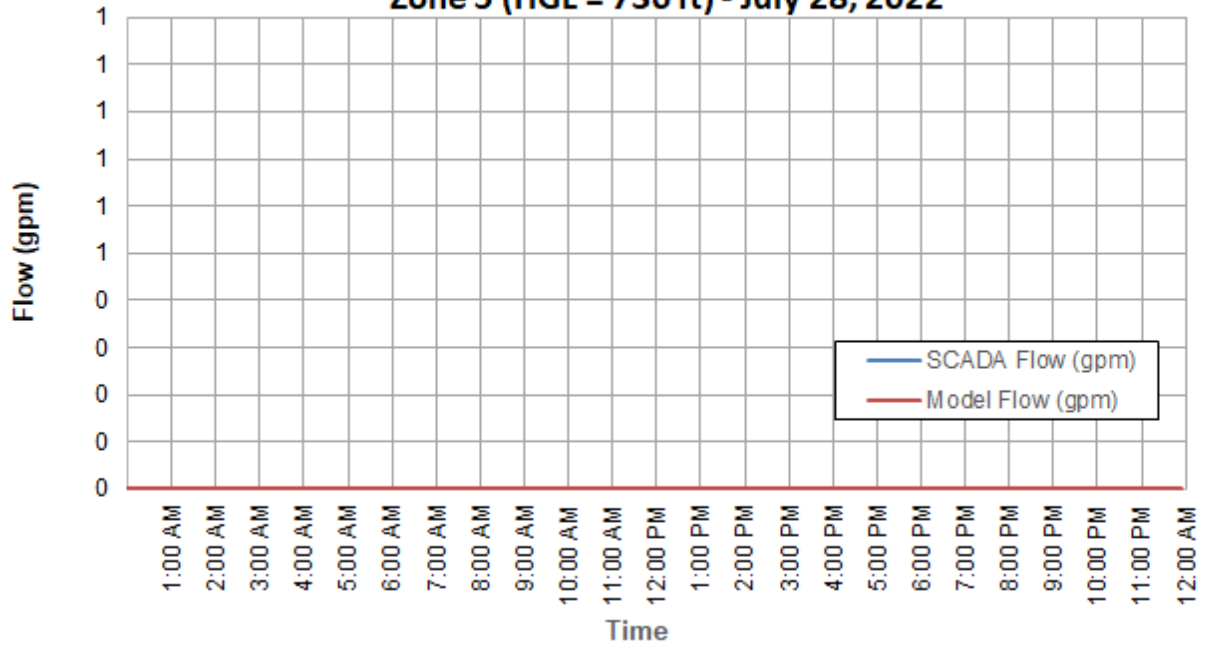




ZONE 5 BOOSTER PUMPS



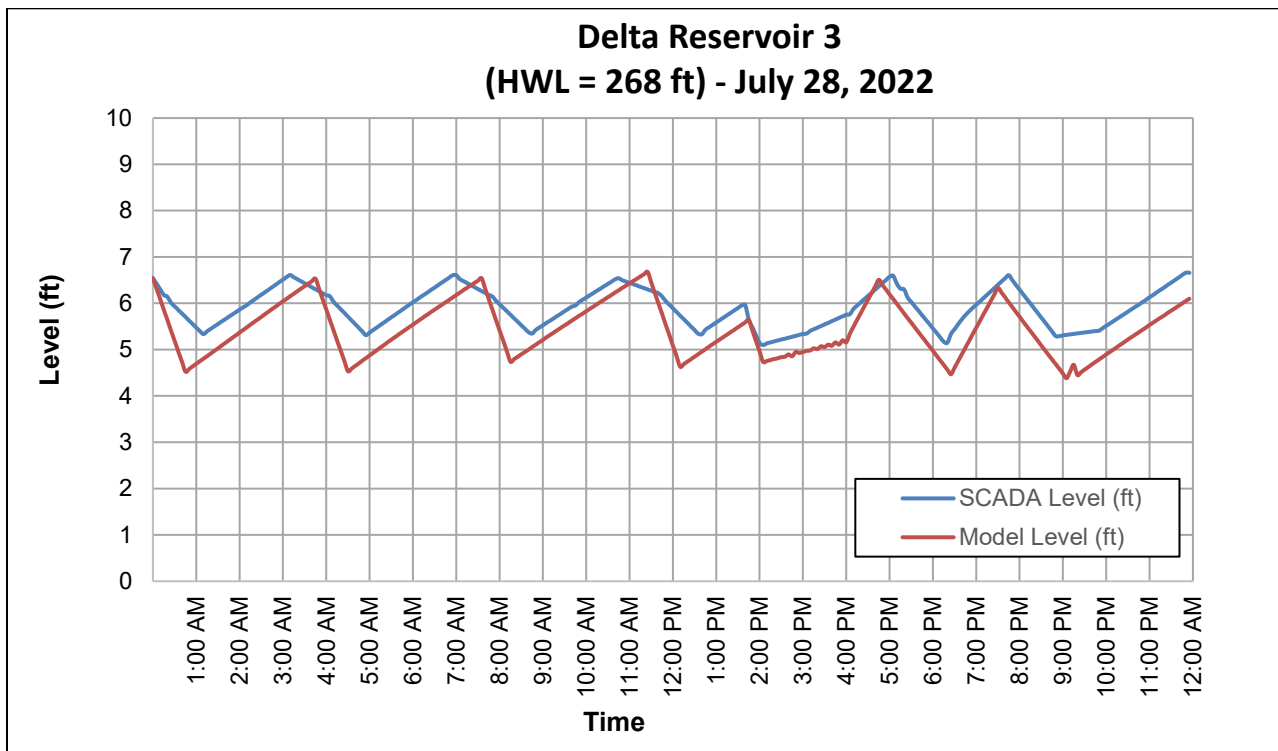
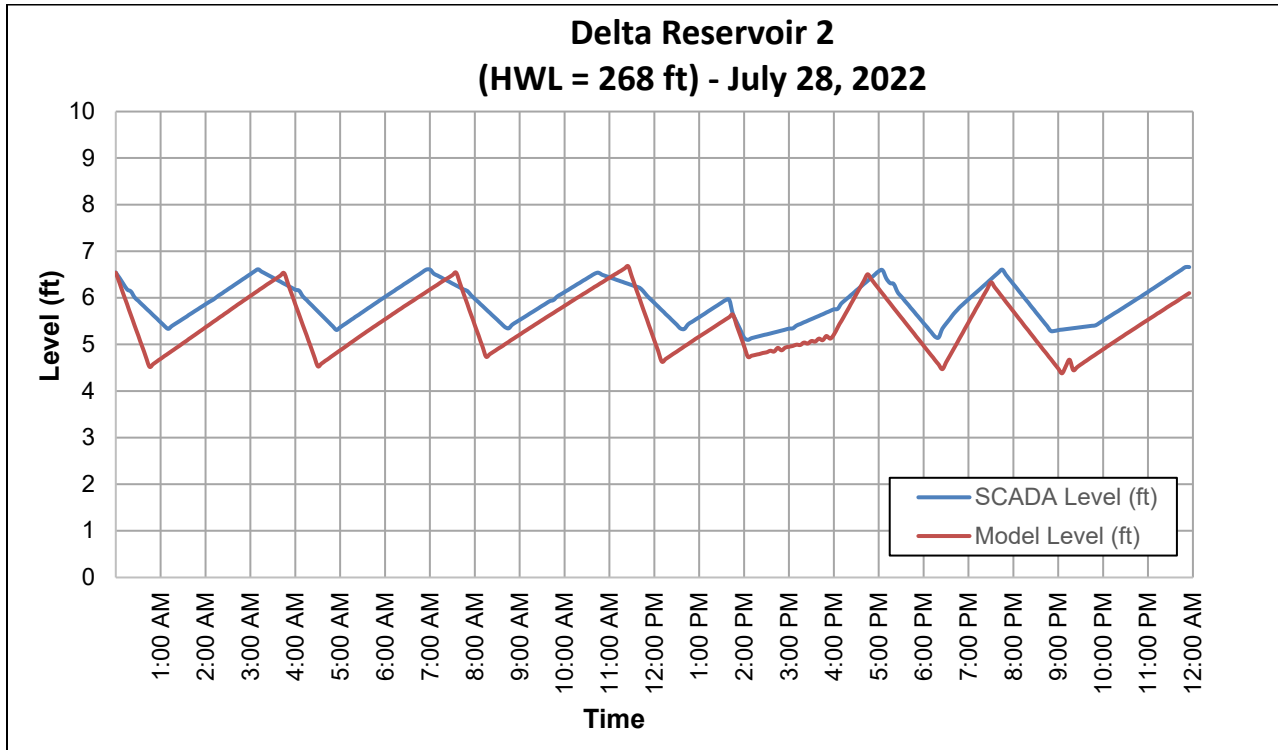
Sombrero Pump 2 Zone 5 (HGL = 736 ft) - July 28, 2022



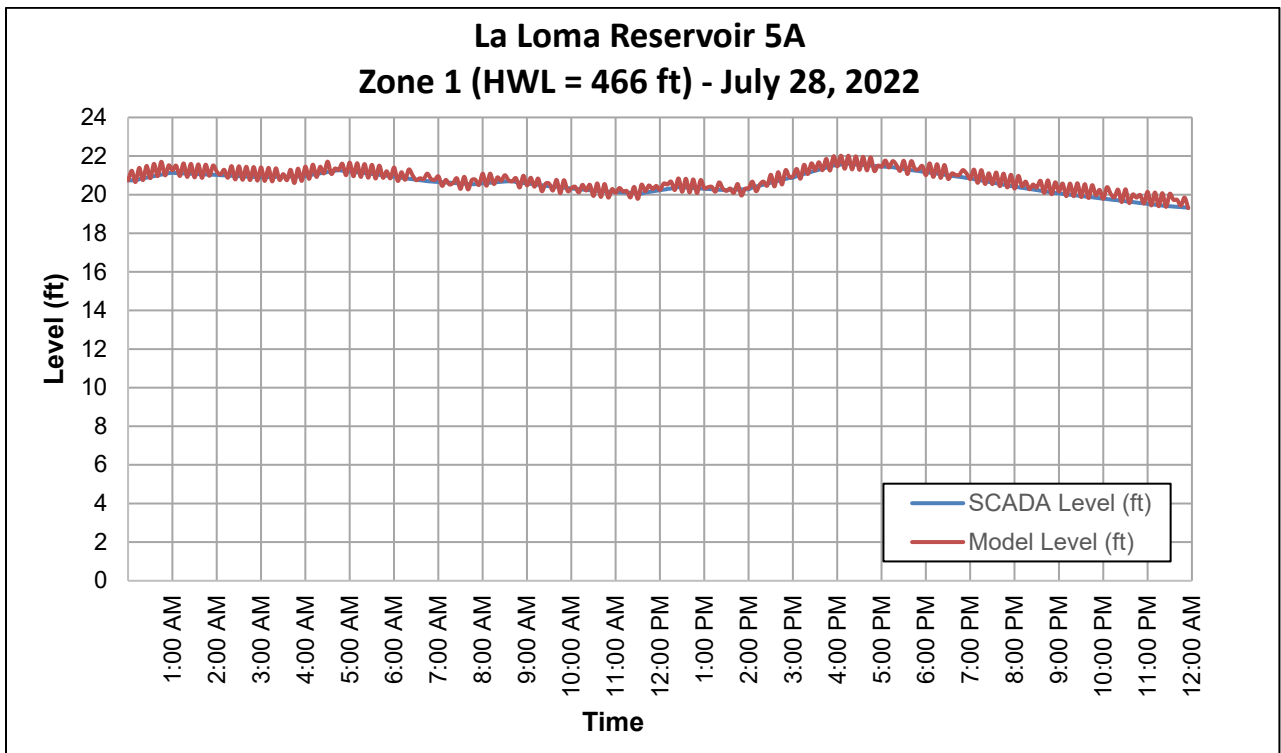
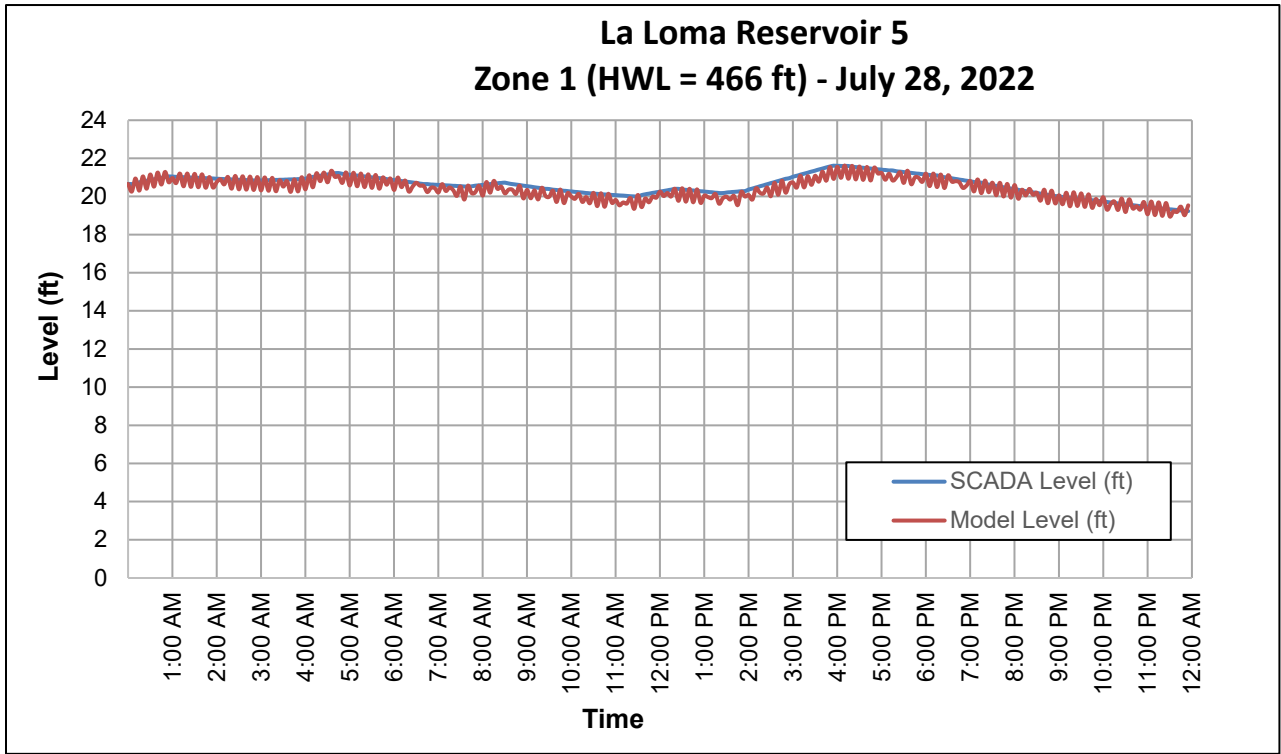
APPENDIX 8-2

RESERVOIR LEVEL DURING CALIBRATION PERIOD

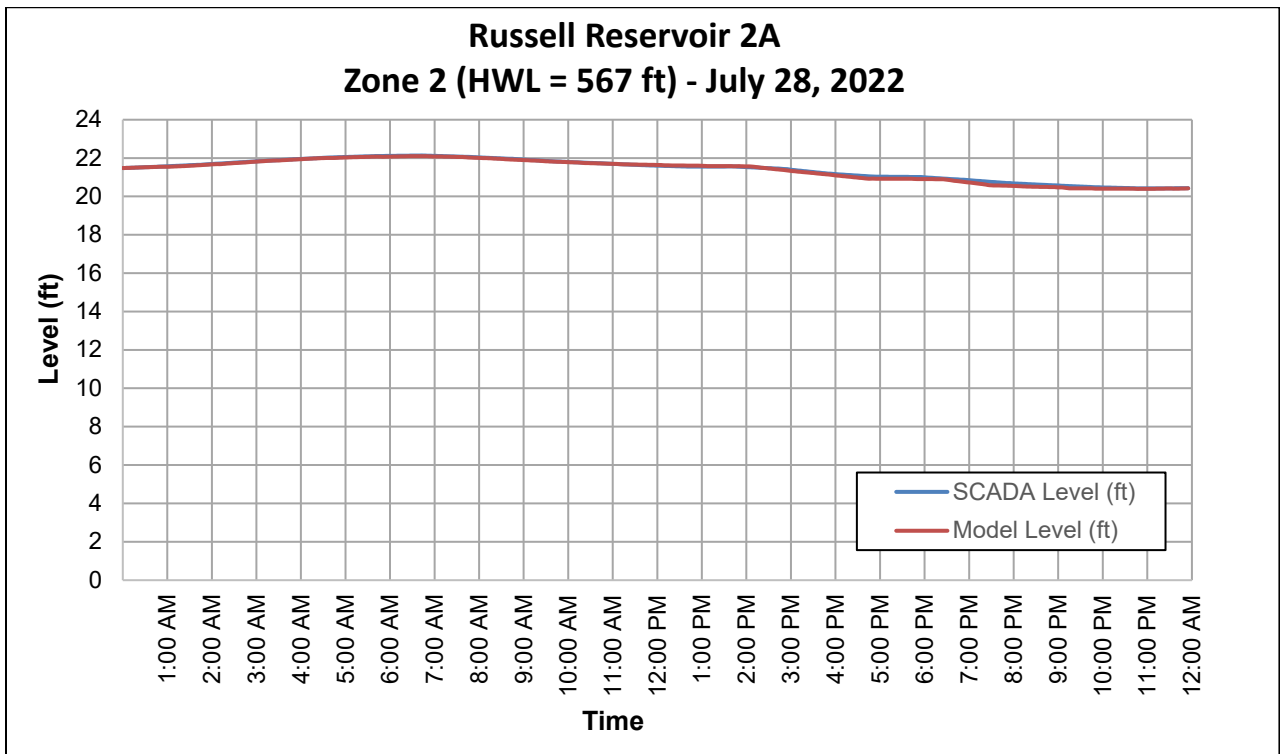
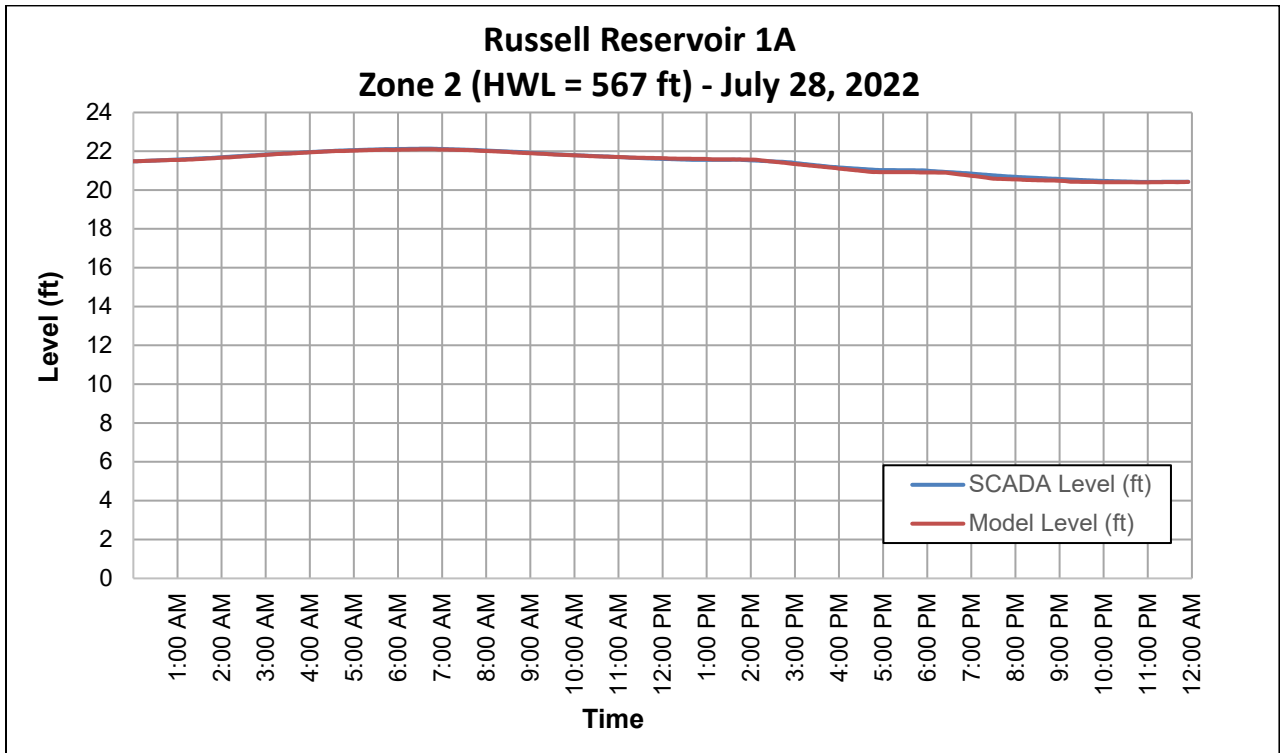
DELTA RESERVOIRS



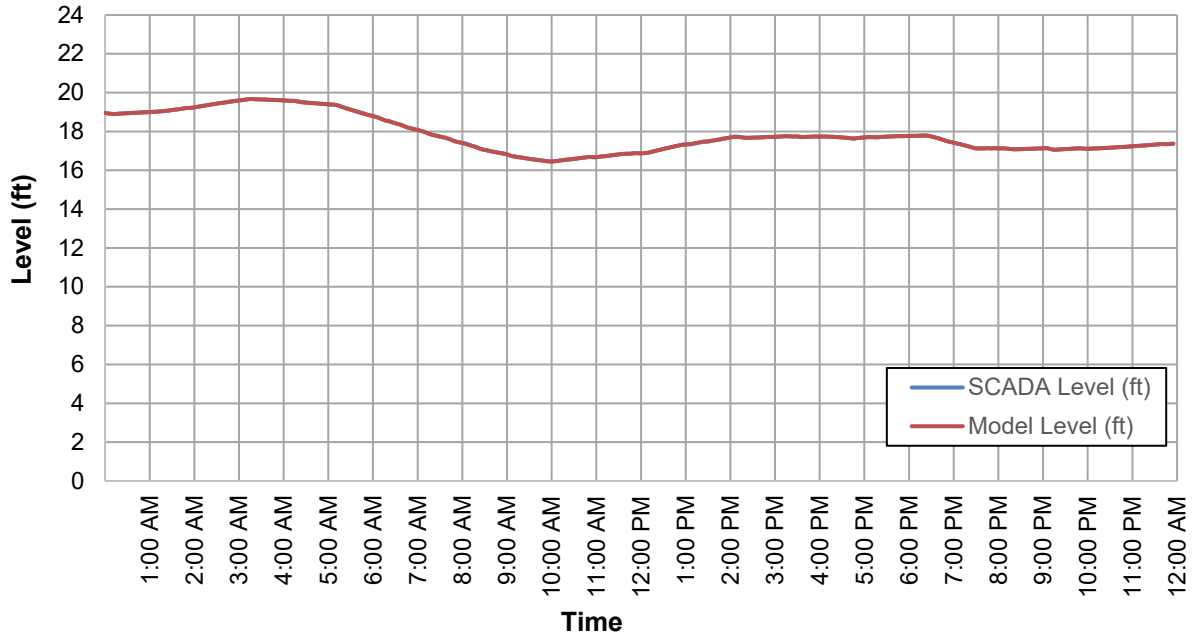
ZONE 1 RESERVOIRS



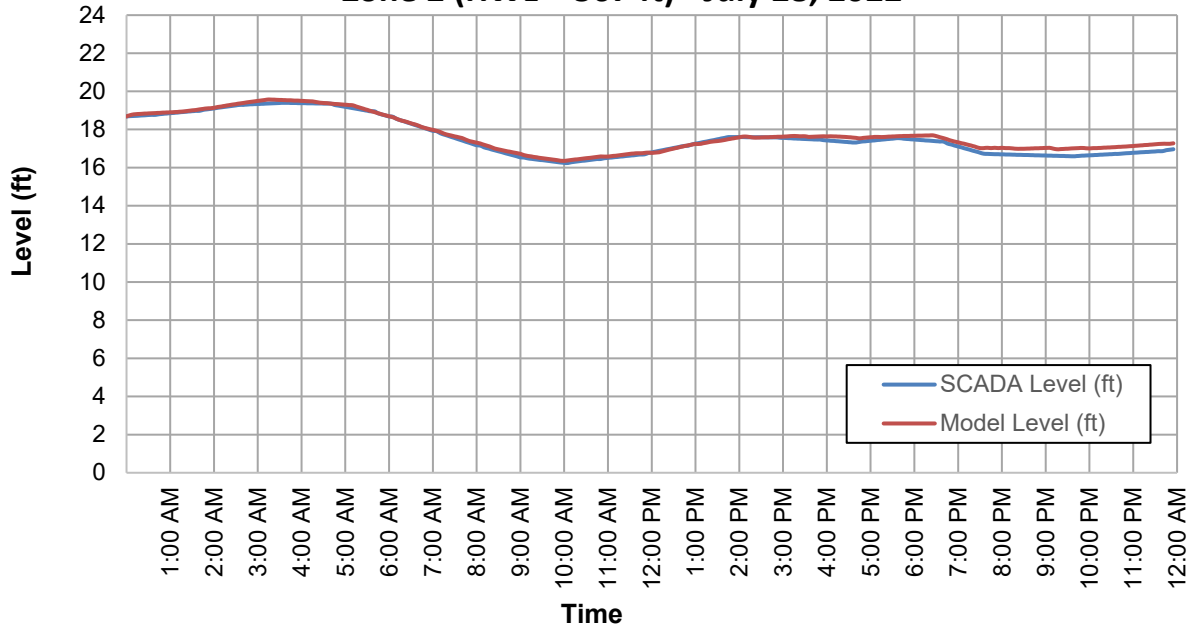
ZONE 2 RESERVOIRS

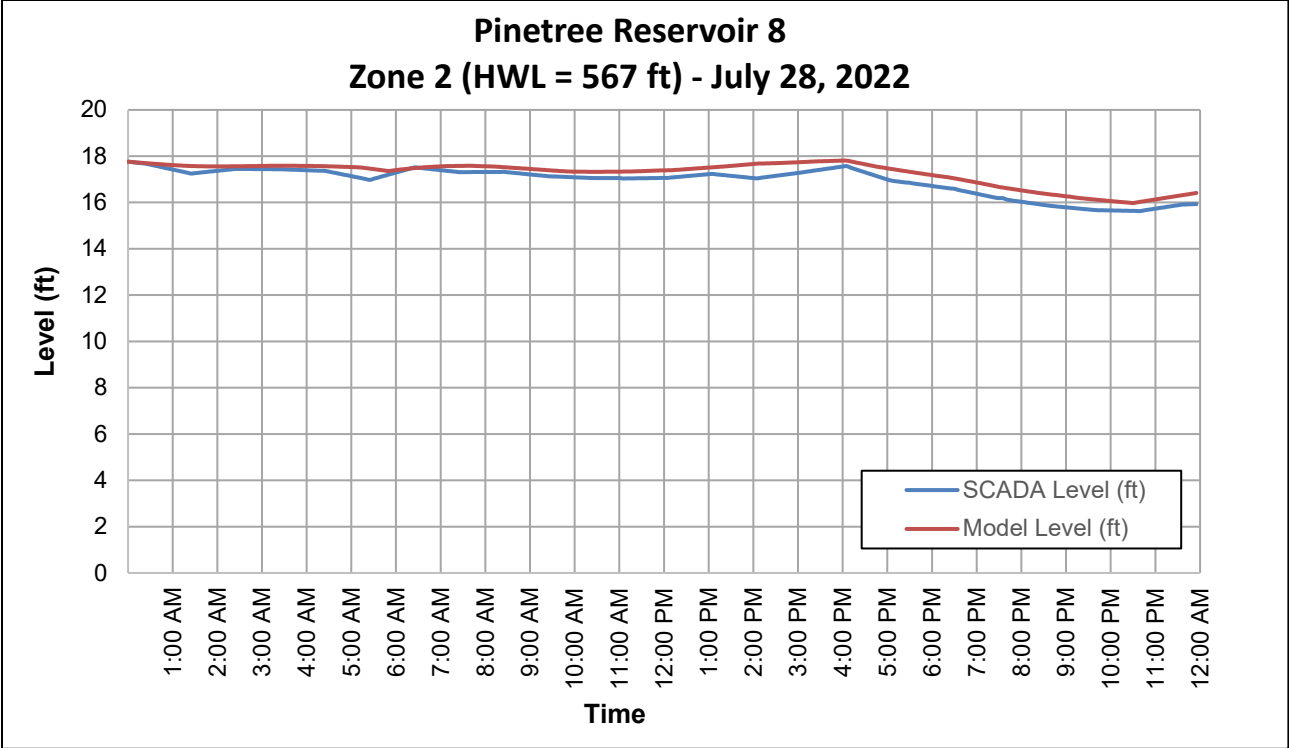


Bradshawe Reservoir 3 Level
Zone 2 (HWL = 567 ft) - July 28, 2022

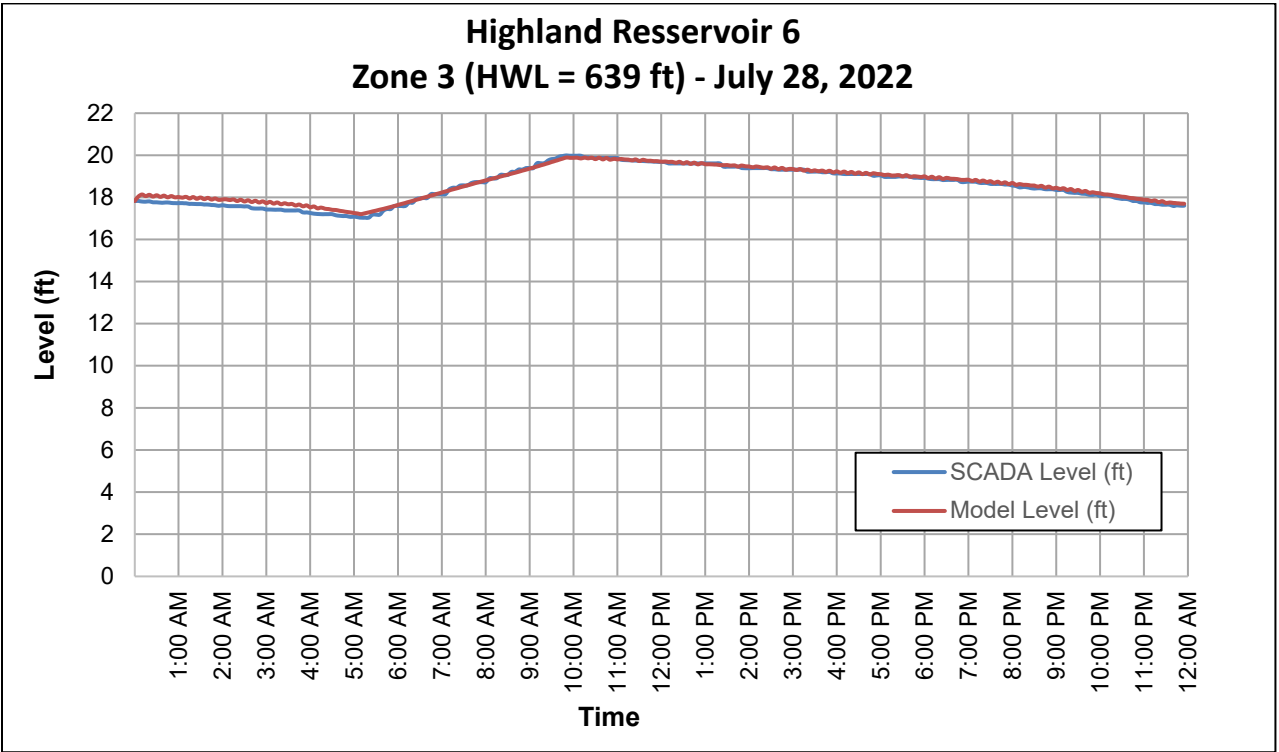


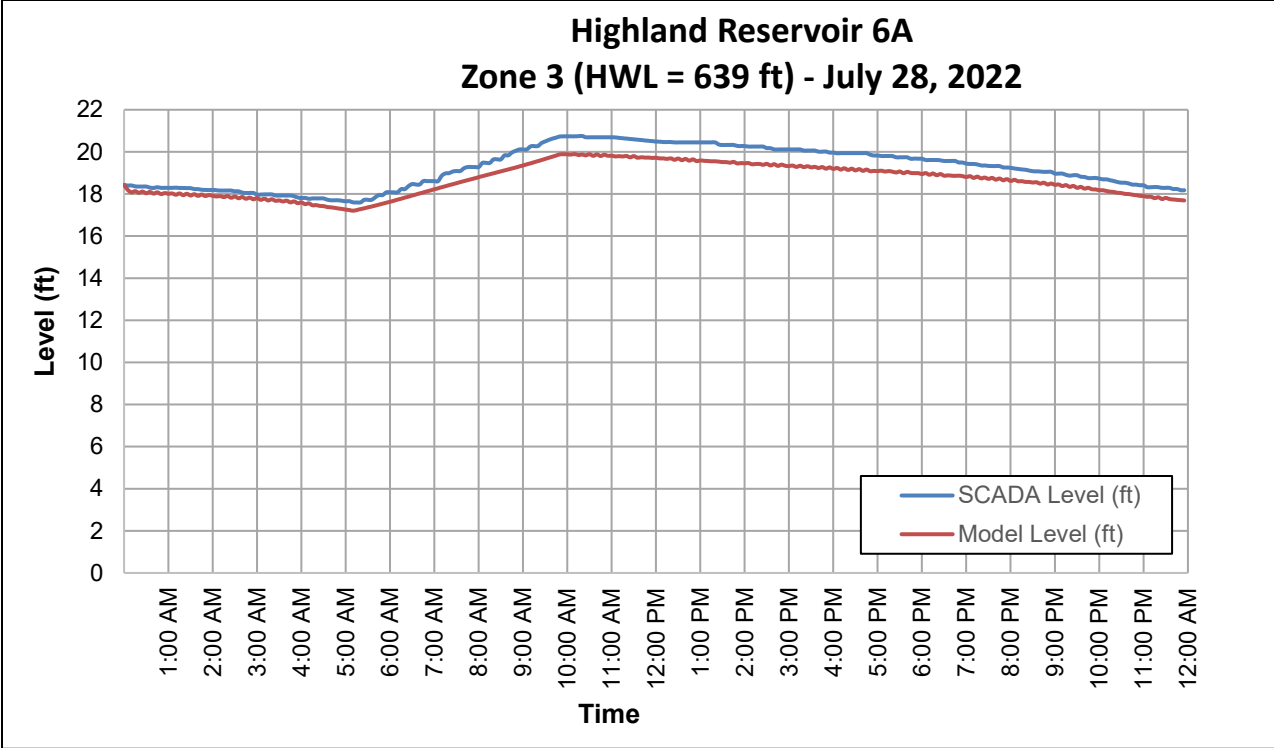
Bradshawe Reservoir 3A Level
Zone 2 (HWL = 567 ft) - July 28, 2022



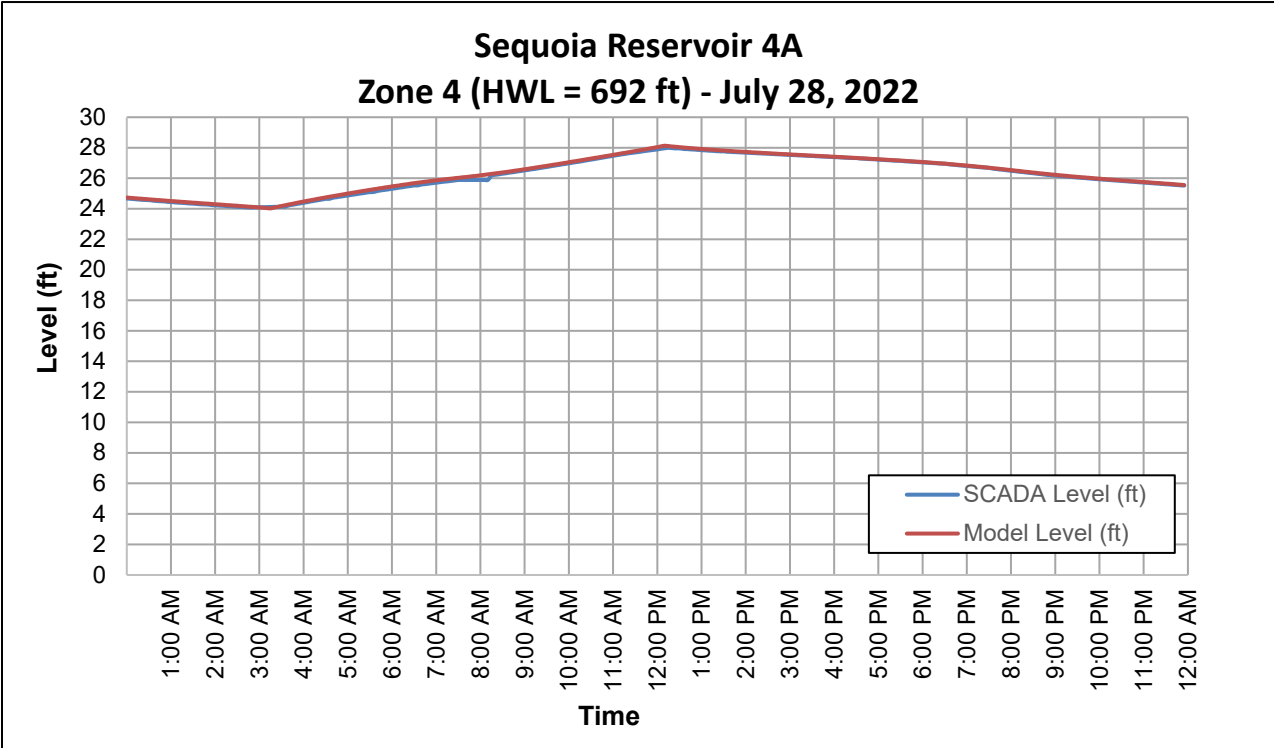


ZONE 3 RESERVOIRS

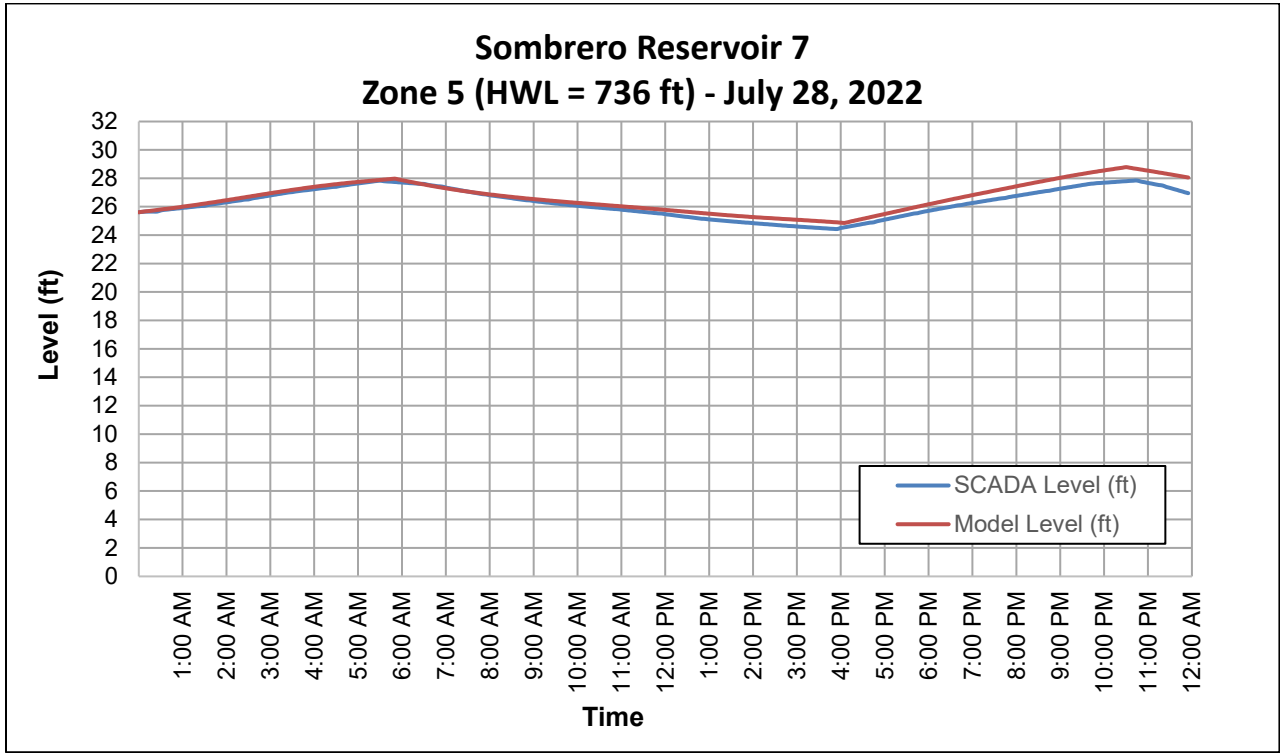




ZONE 4 RESERVOIRS



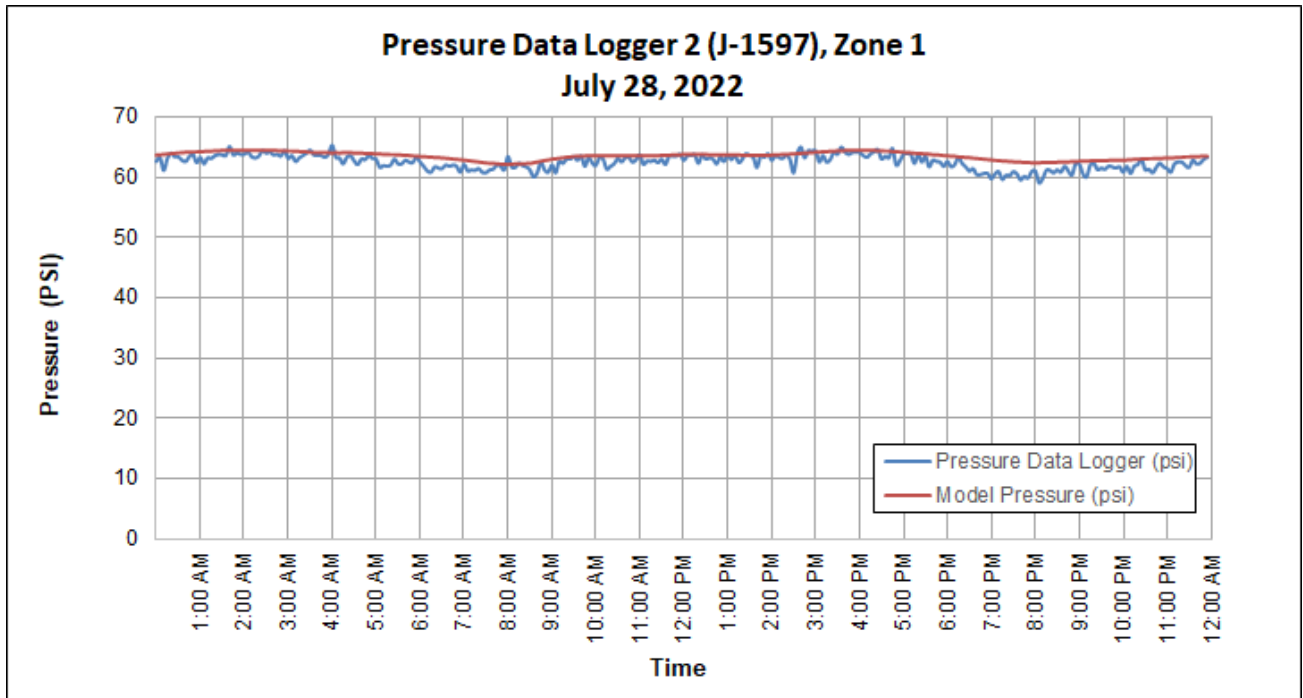
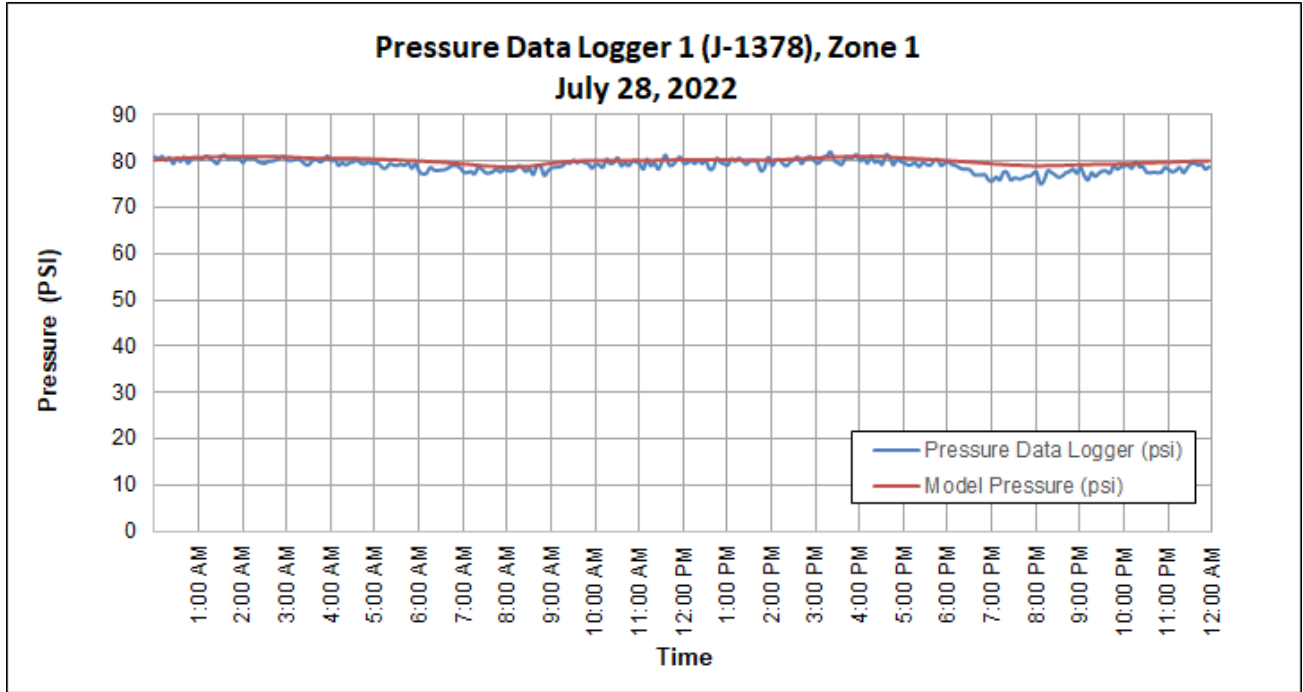
ZONE 5 RESERVOIRS

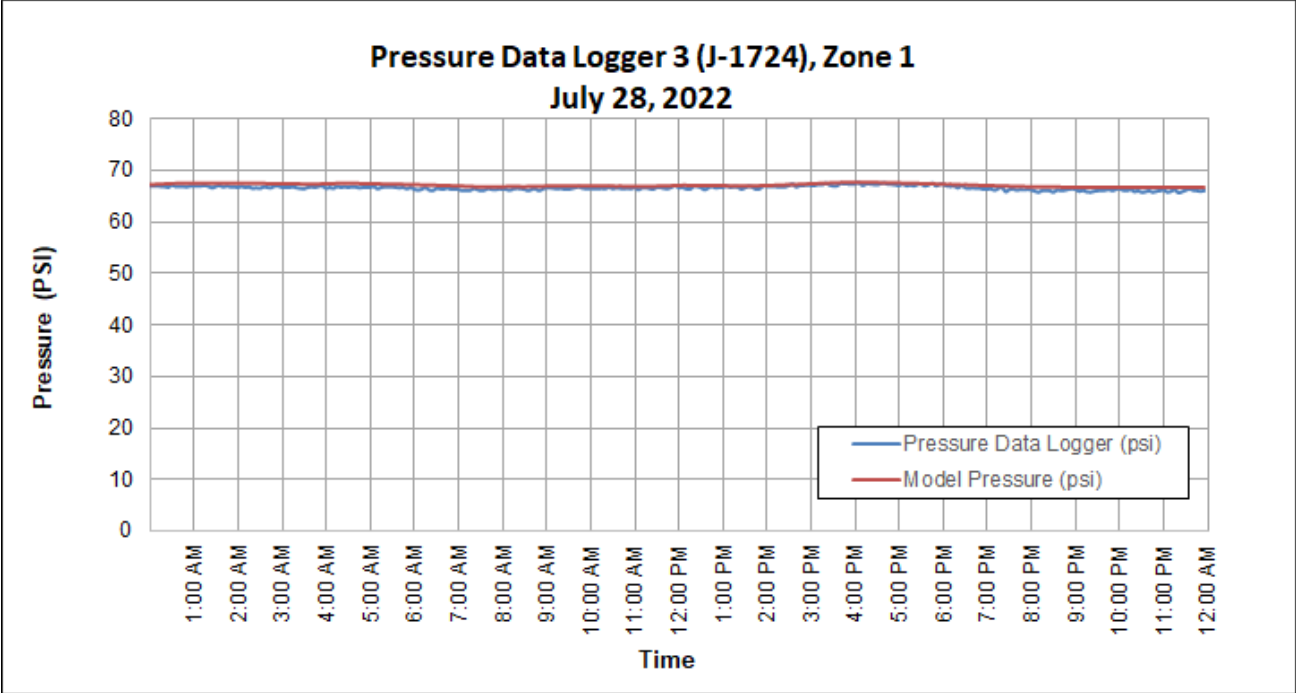


APPENDIX 8-3

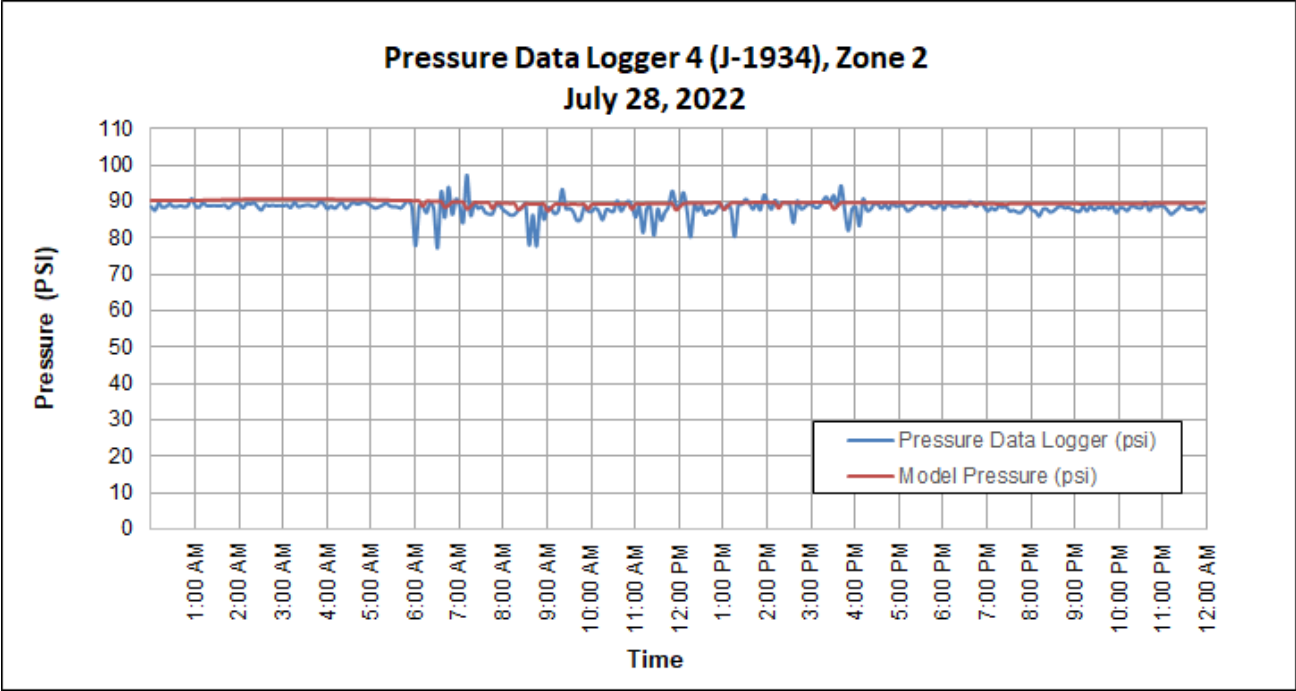
PRESSURE DATA DURING CALIBRATION PERIOD

ZONE 1 PRESSURES

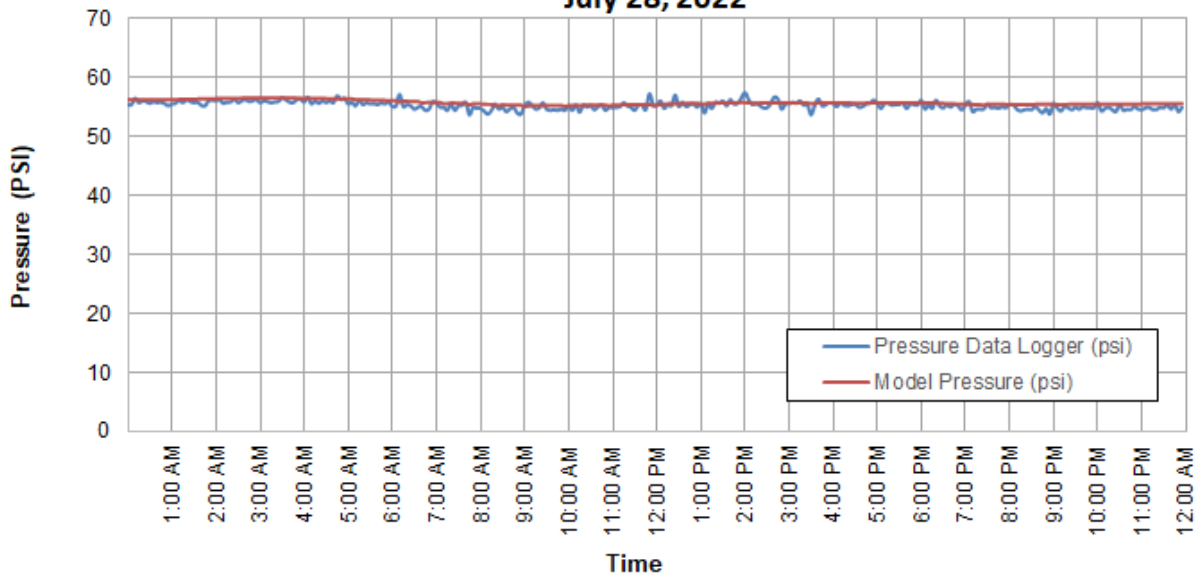




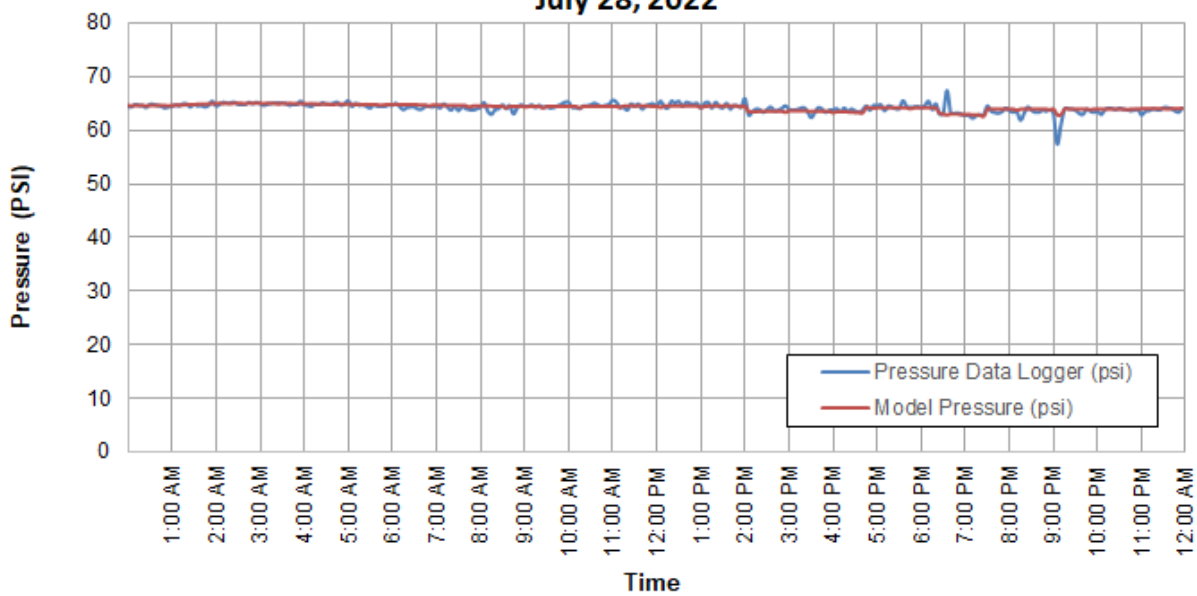
ZONE 2 PRESSURES



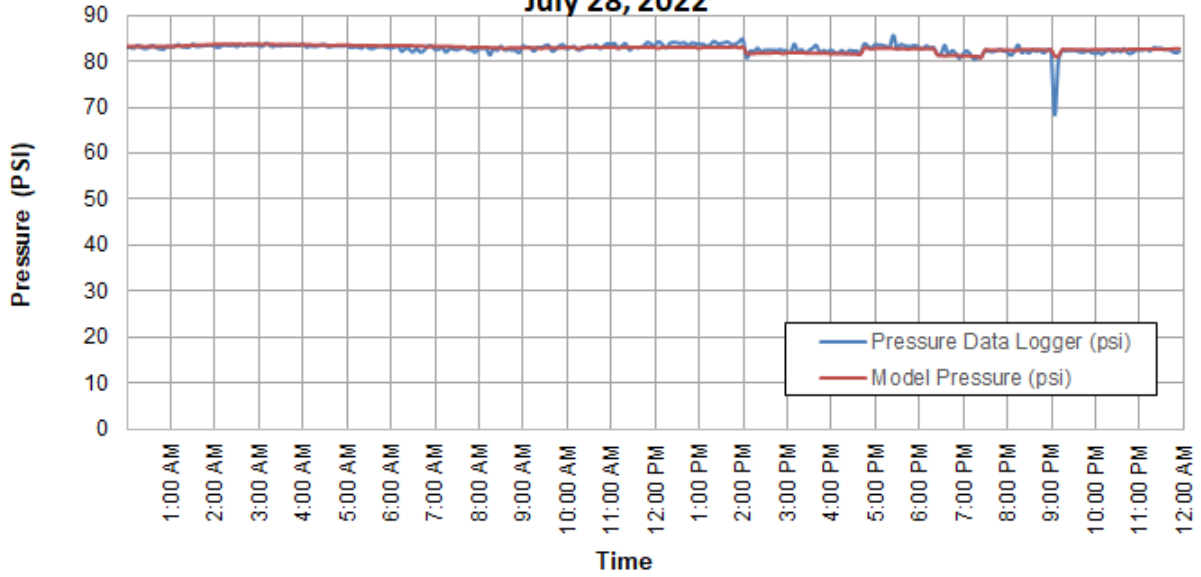
Pressure Data Logger 5 (J-1552), Zone 2
July 28, 2022



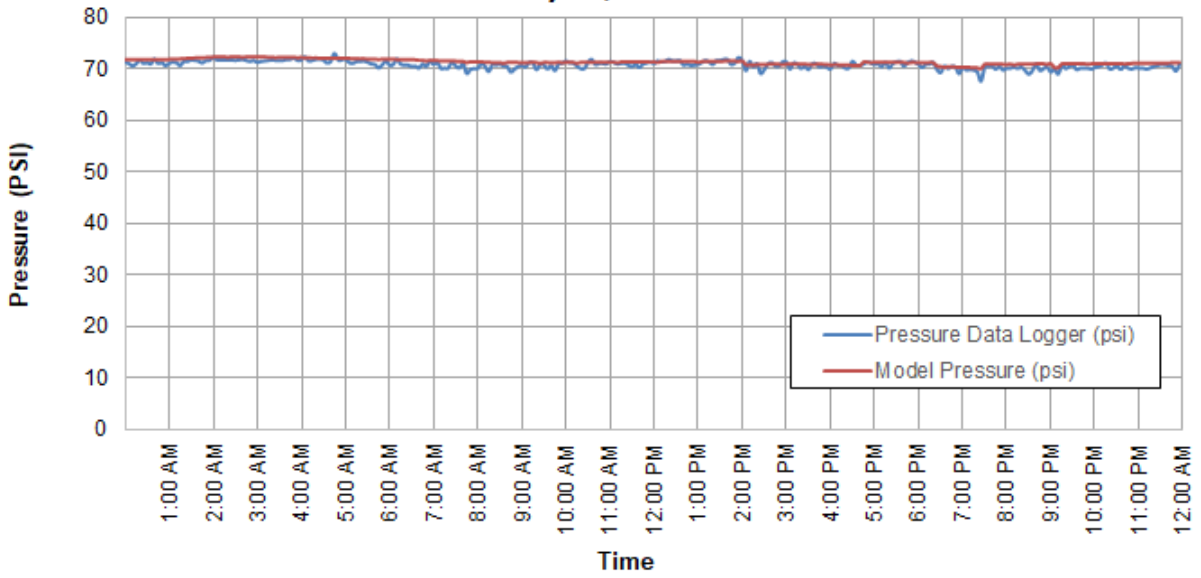
Pressure Data Logger 6 (J-1843), Zone 2
July 28, 2022



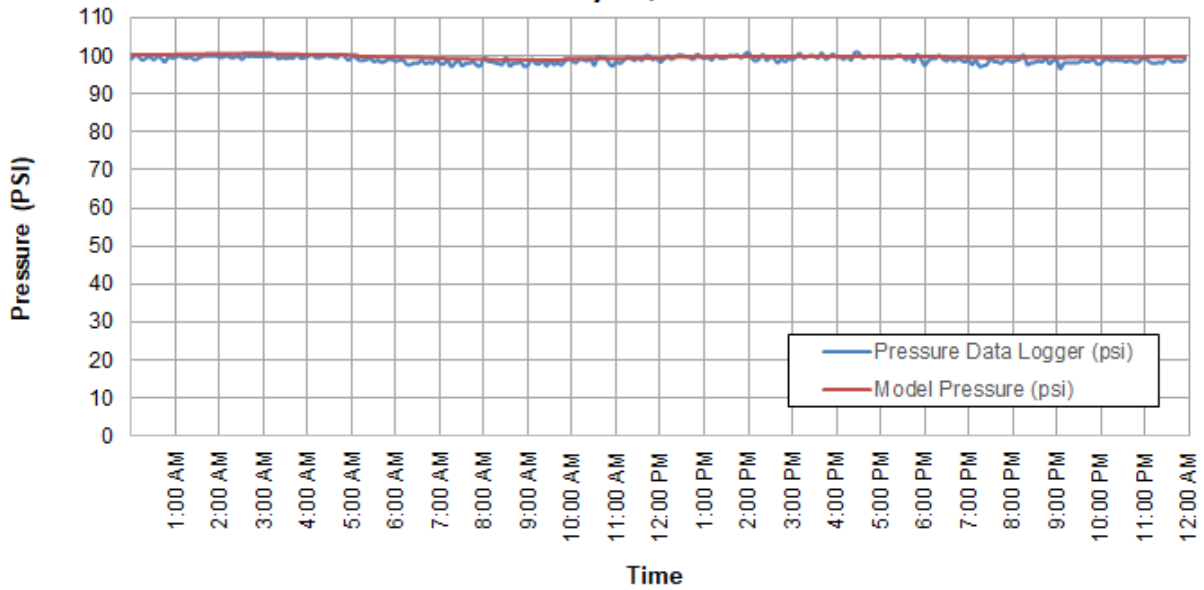
Pressure Data Logger 7 (J-1959), Zone 2
July 28, 2022



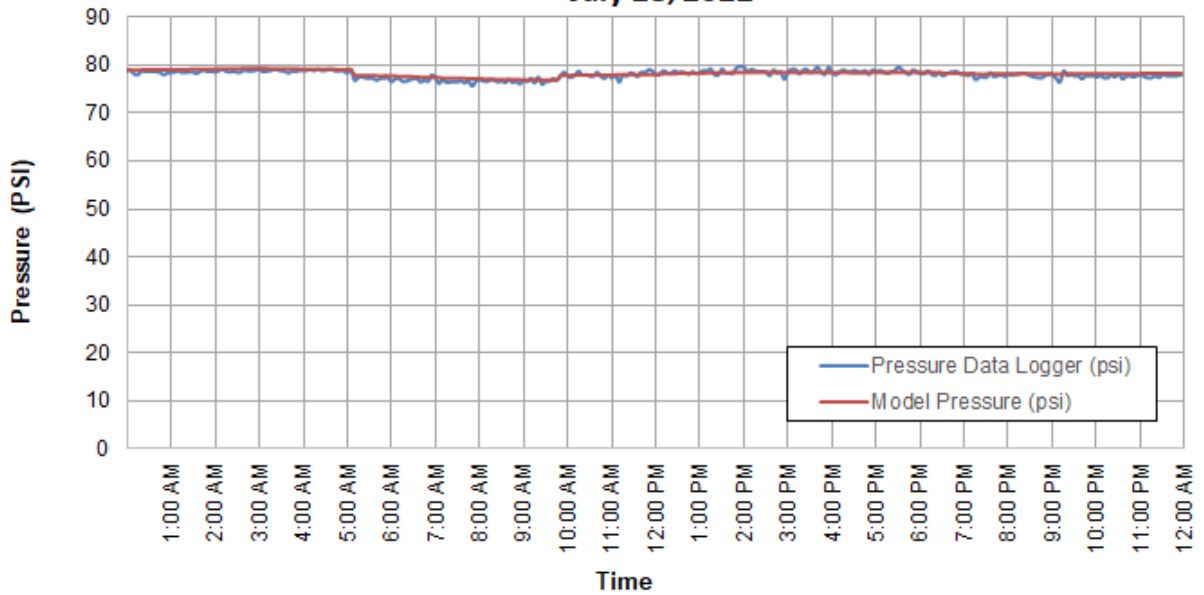
Pressure Data Logger 8 (J-1778), Zone 2
July 28, 2022



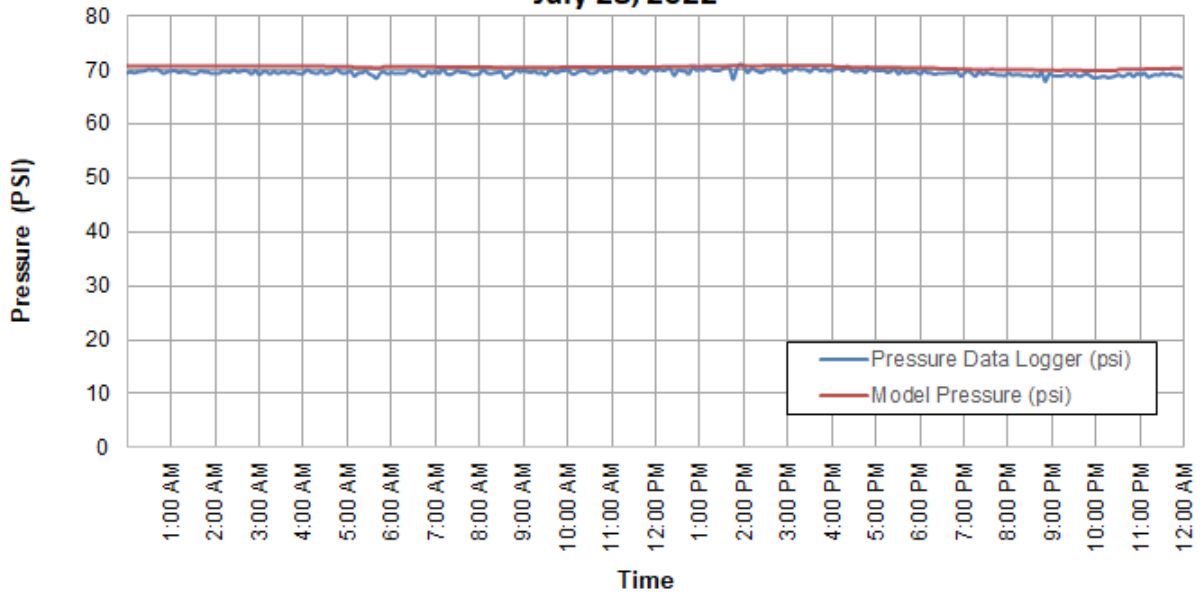
Pressure Data Logger 9 (J-1639), Zone 2
July 28, 2022



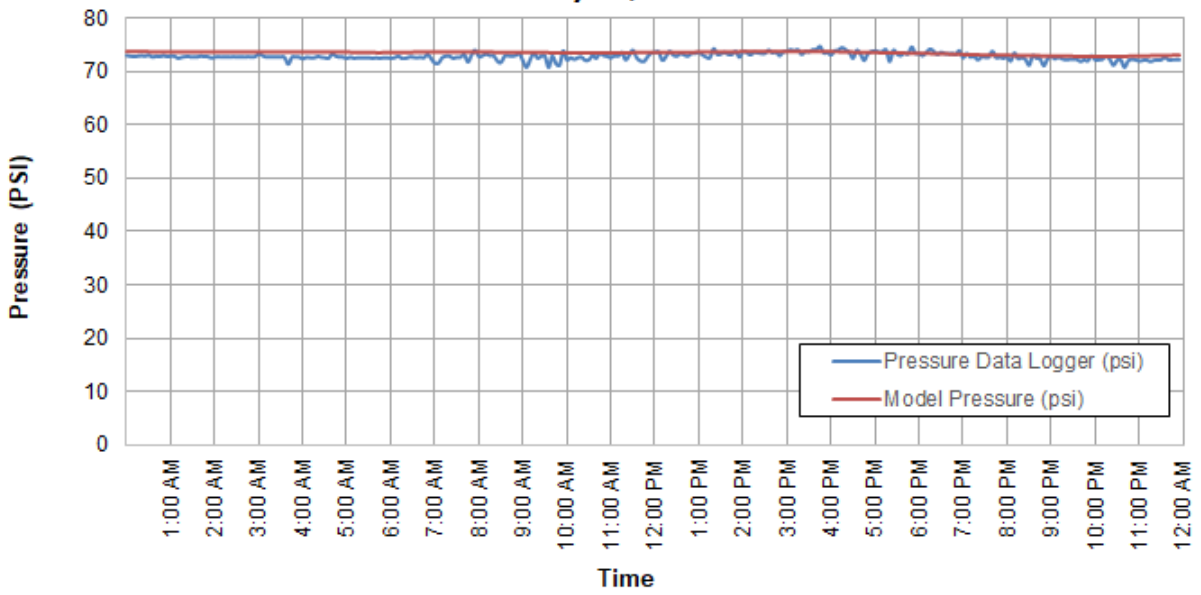
Pressure Data Logger 10 (J-1425), Zone 2
July 28, 2022

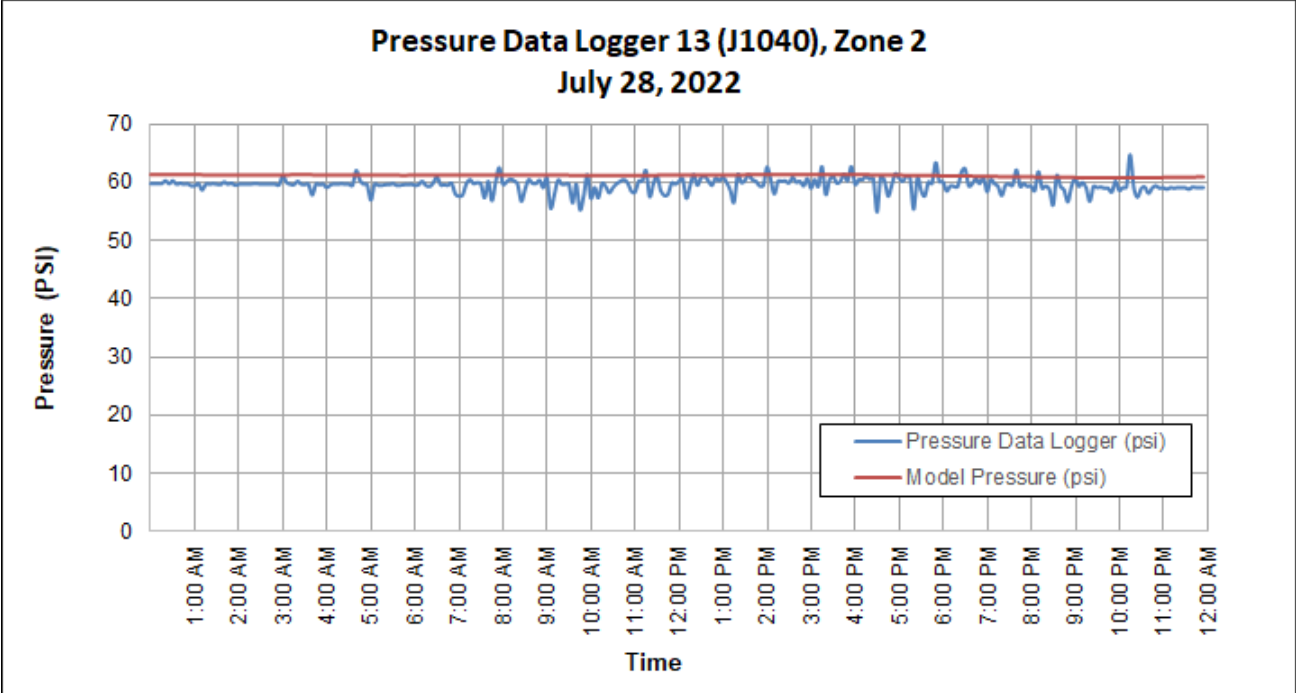


Pressure Data Logger 11 (J-1158), Zone 2
July 28, 2022

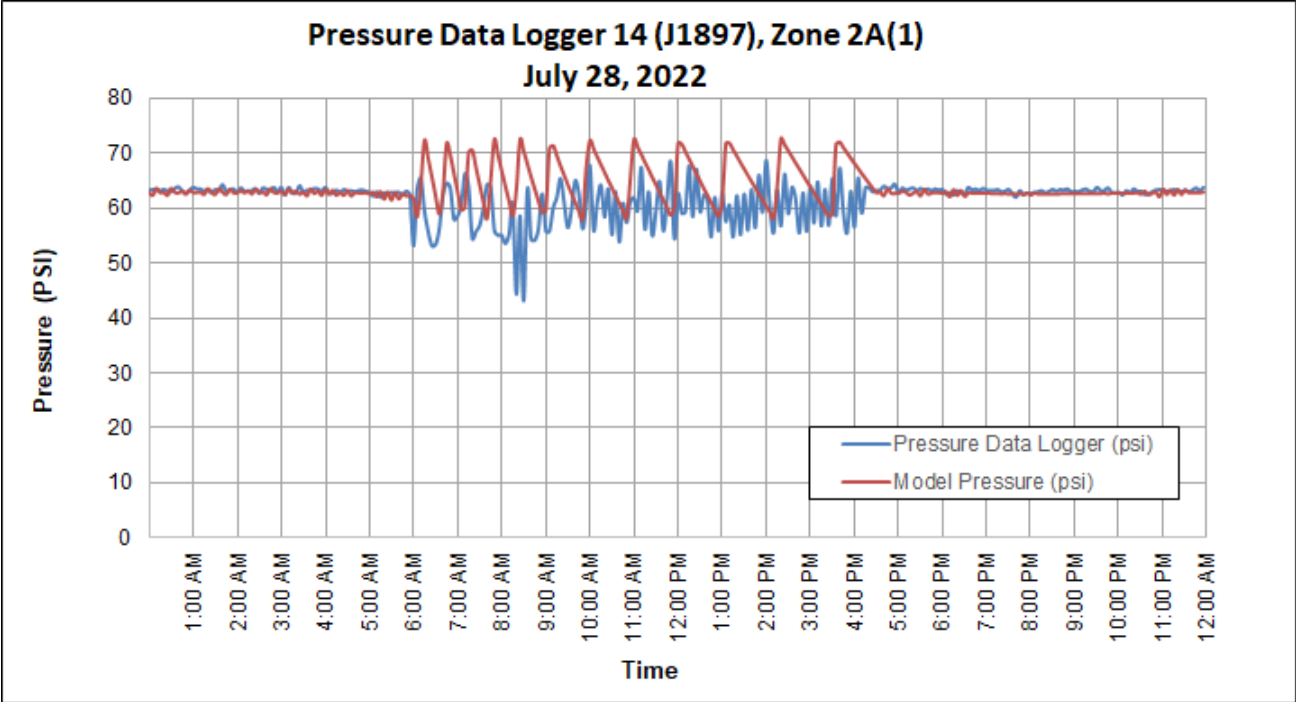


Pressure Data Logger 12 (J-1016), Zone 2
July 28, 2022

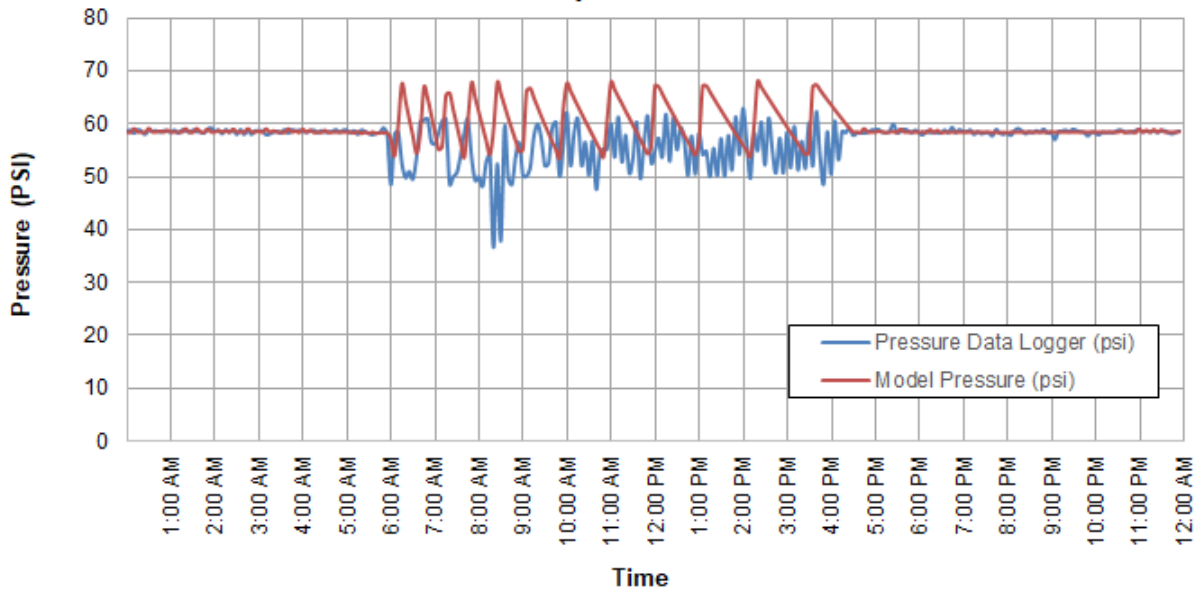




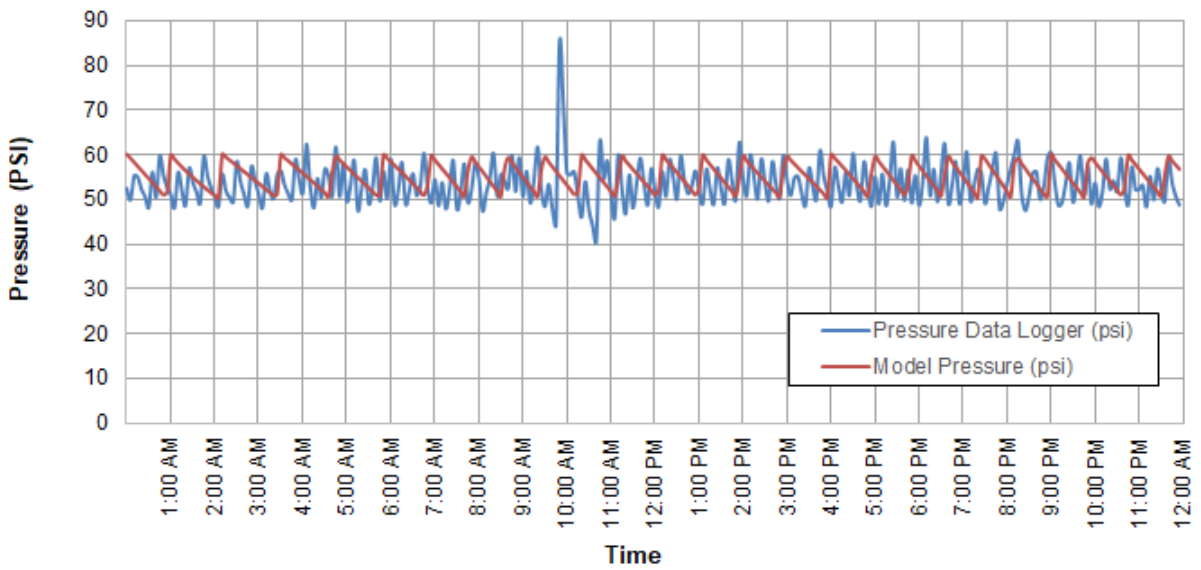
ZONE 2A and 2B PRESSURES



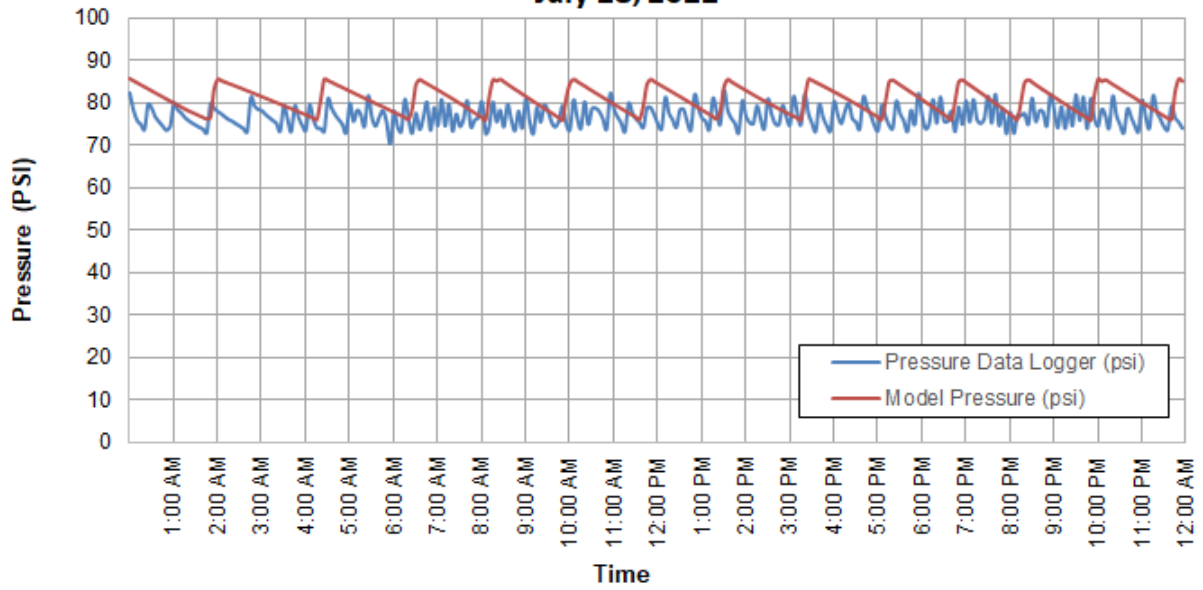
Pressure Data Logger 15 (J-1993), Zone 2A(1)
July 28, 2022



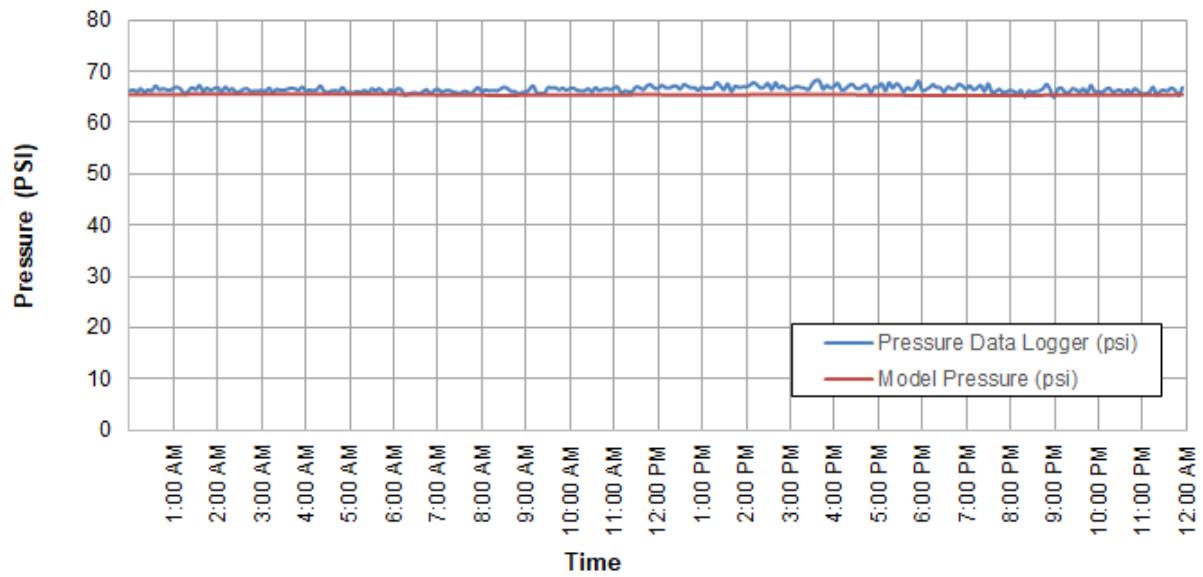
Pressure Data Logger 16 (J-1669), Zone 2A(2)
July 28, 2022

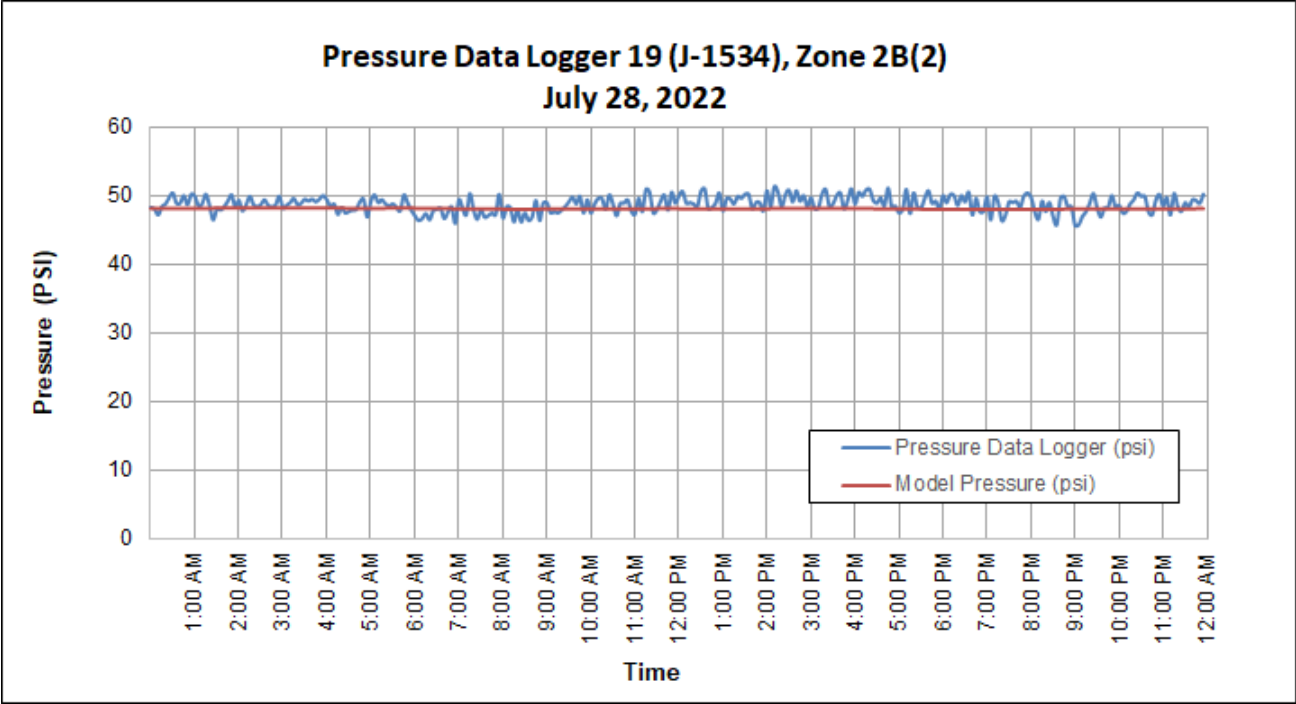


Pressure Data Logger 17 (J-1512), Zone 2A(3)
July 28, 2022

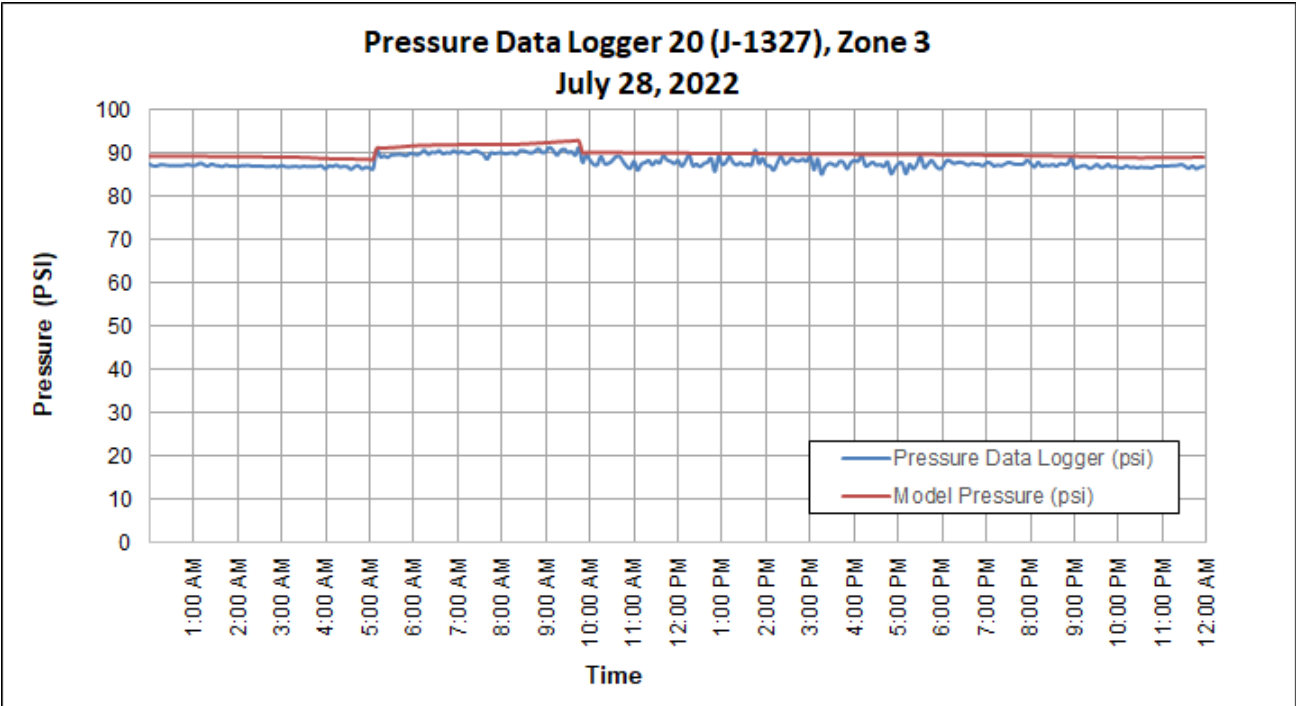


Pressure Data Logger 18 (J-1542), Zone 2B(1)
July 28, 2022

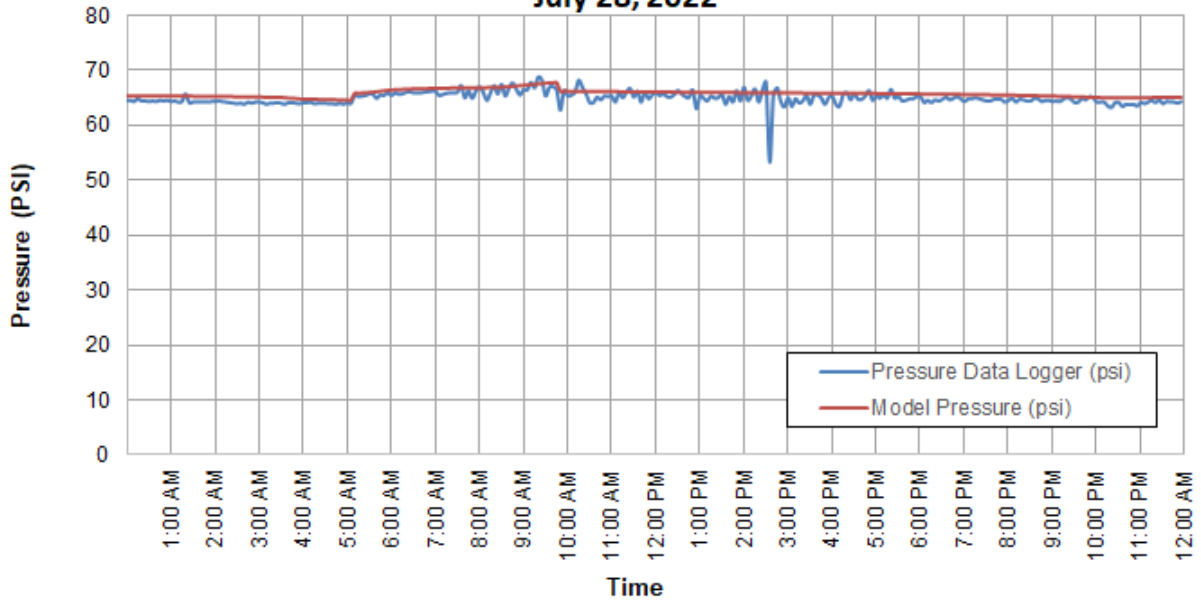




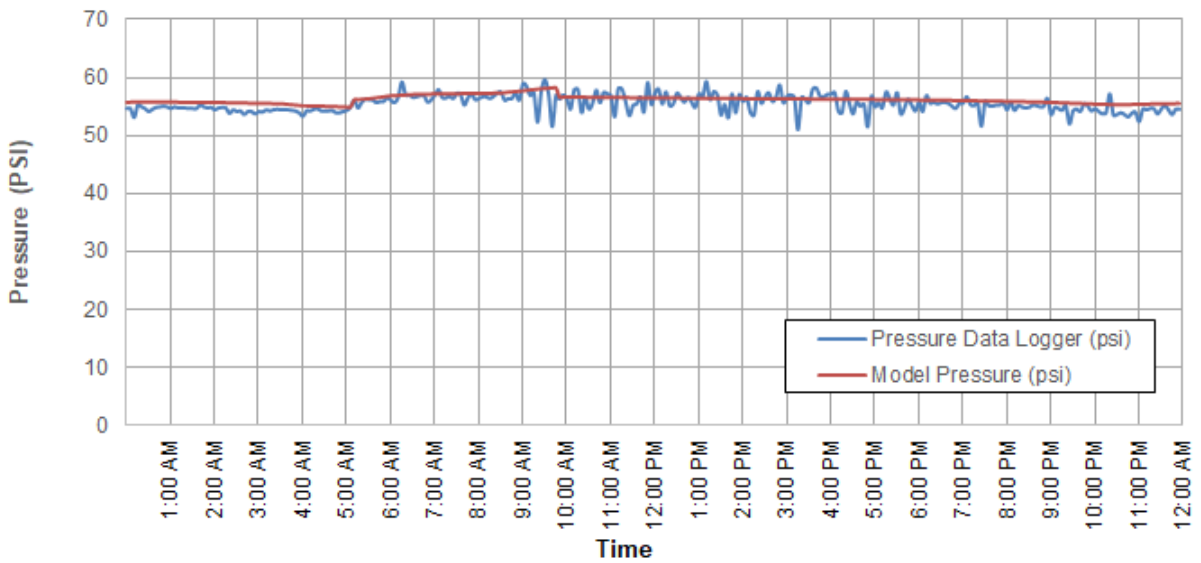
ZONE 3 PRESSURES



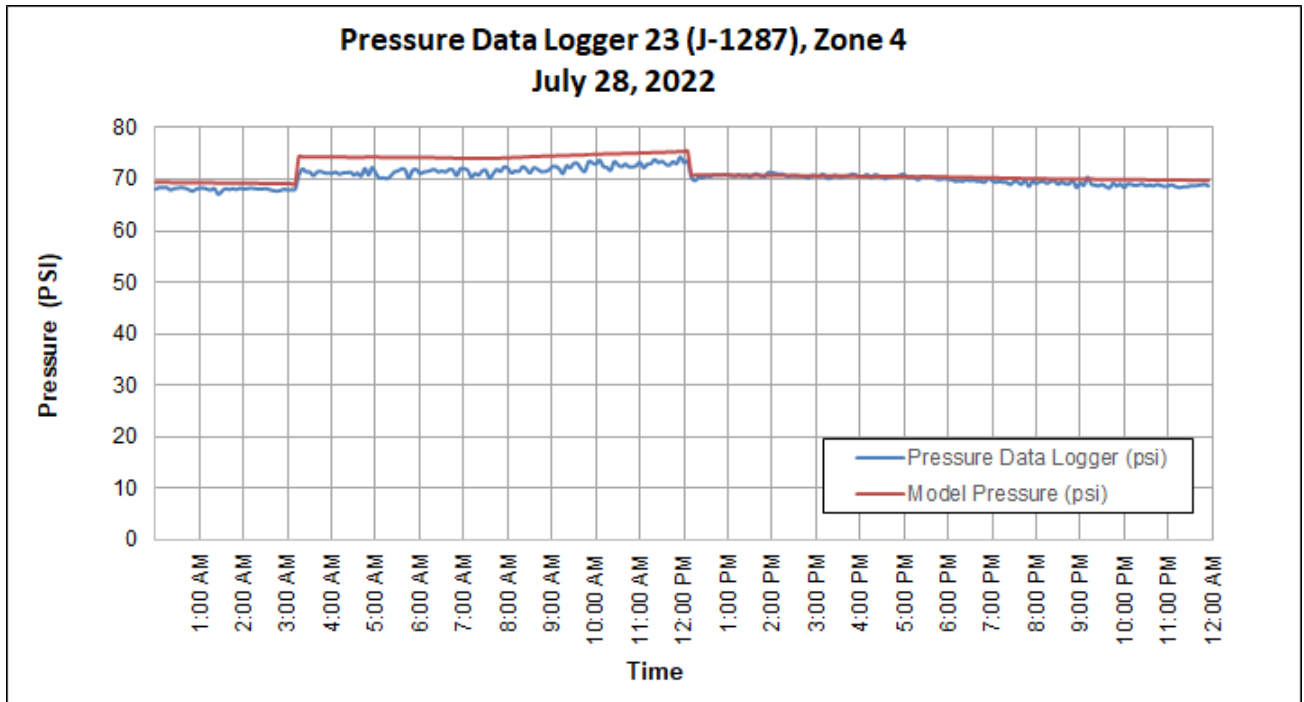
Pressure Data Logger 21 (J-1173), Zone 3
July 28, 2022



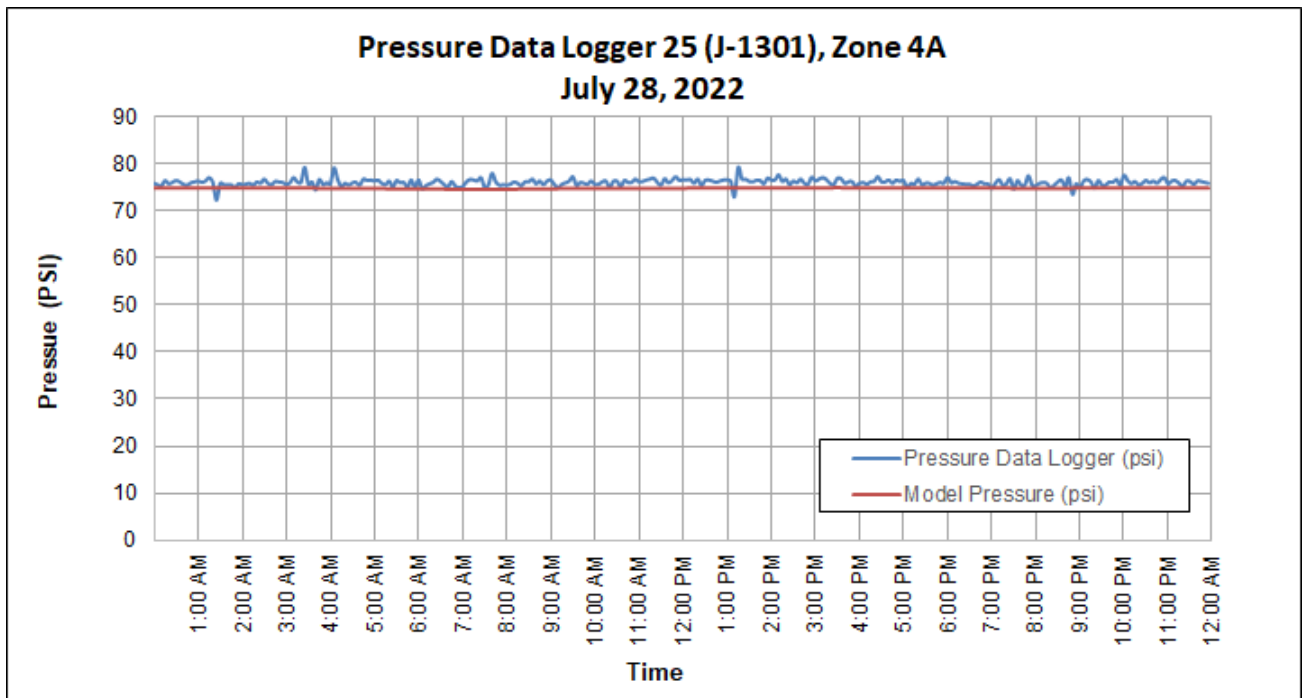
Pressure Data Logger 22 (J-1056), Zone 3
July 28, 2022



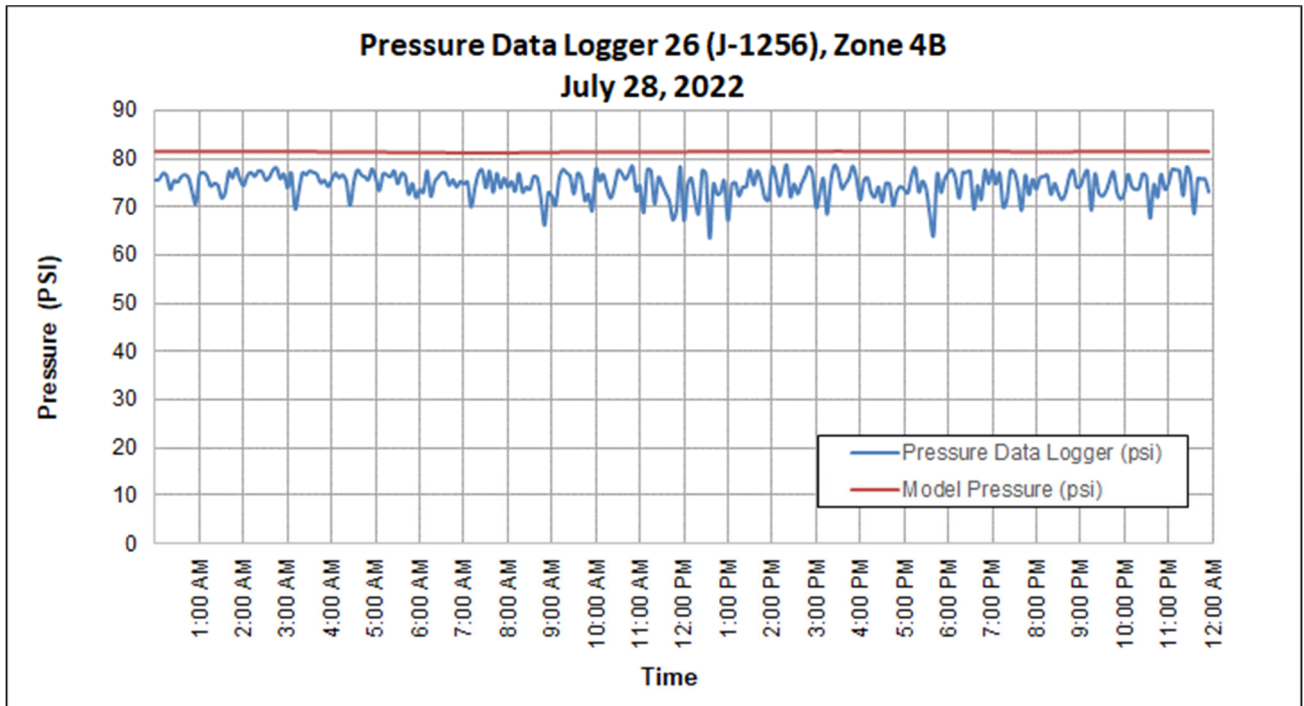
ZONE 4 PRESSURES



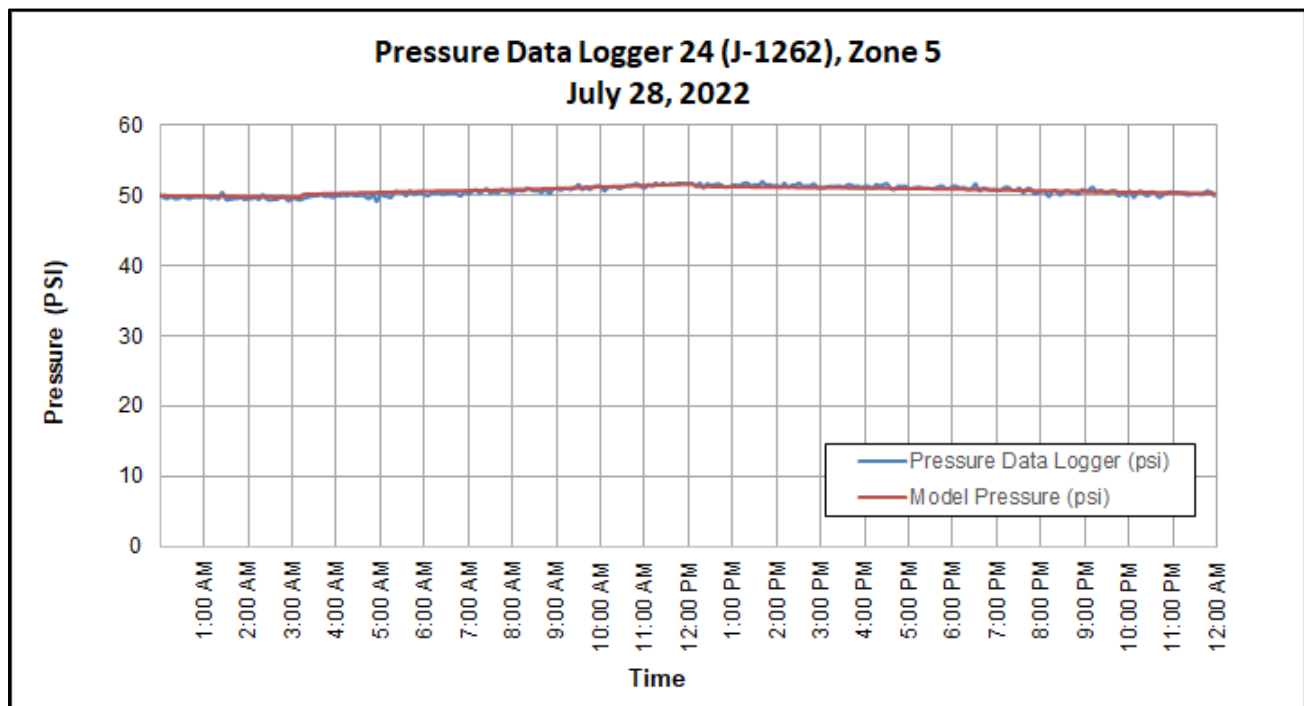
ZONE 4A PRESSURES



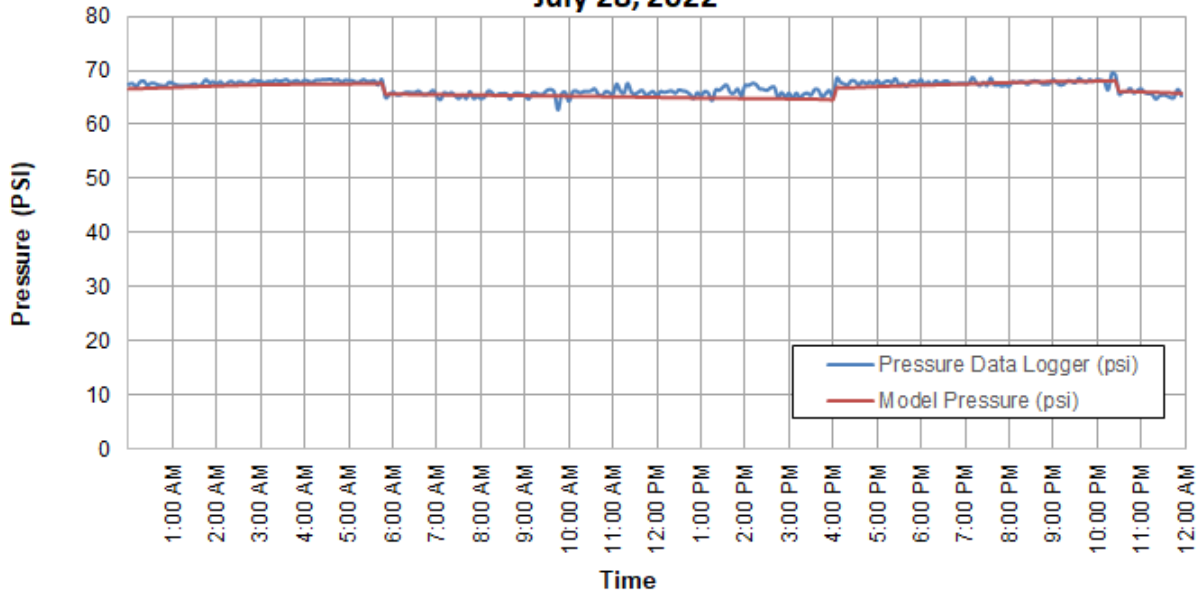
ZONE 4B PRESSURES



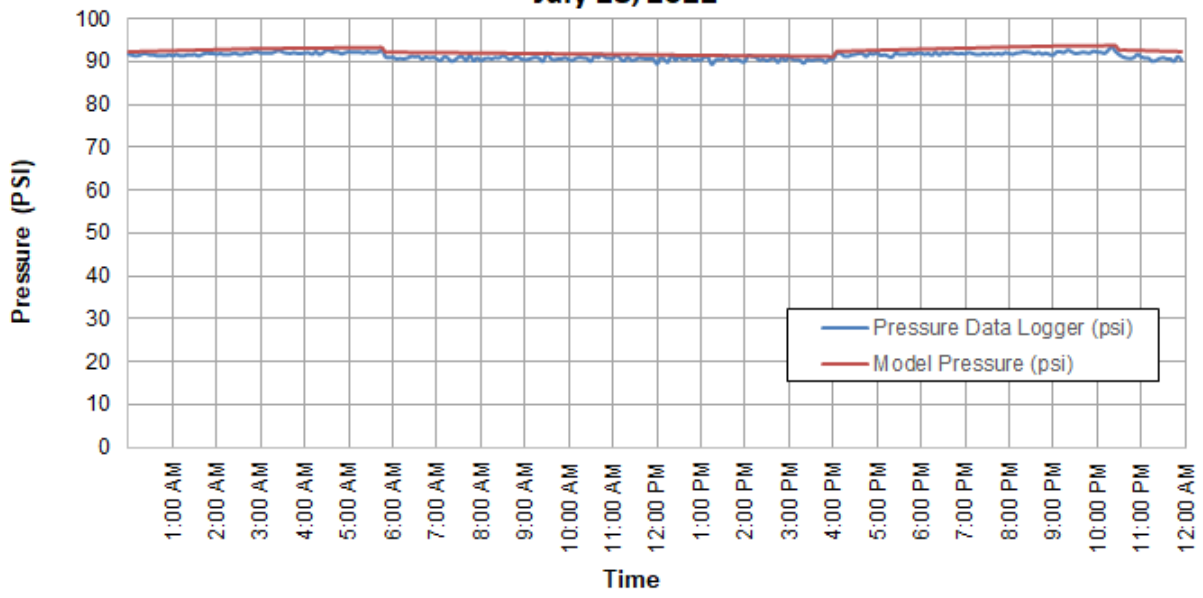
ZONE 5 PRESSURES



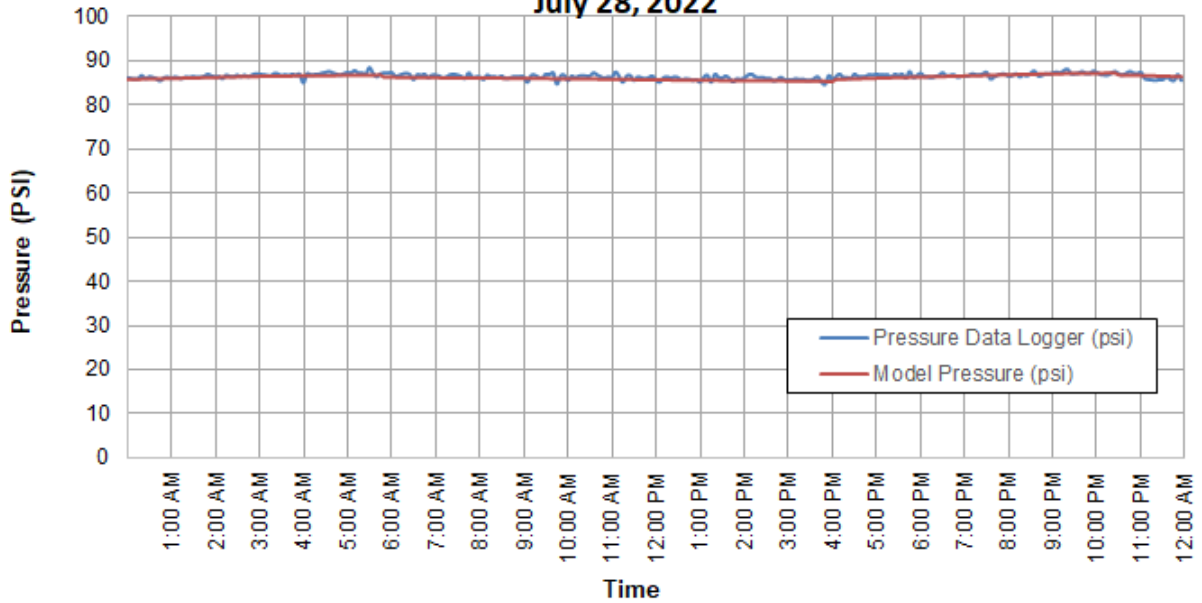
Pressure Data Logger 27 (J-1164), Zone 5
July 28, 2022



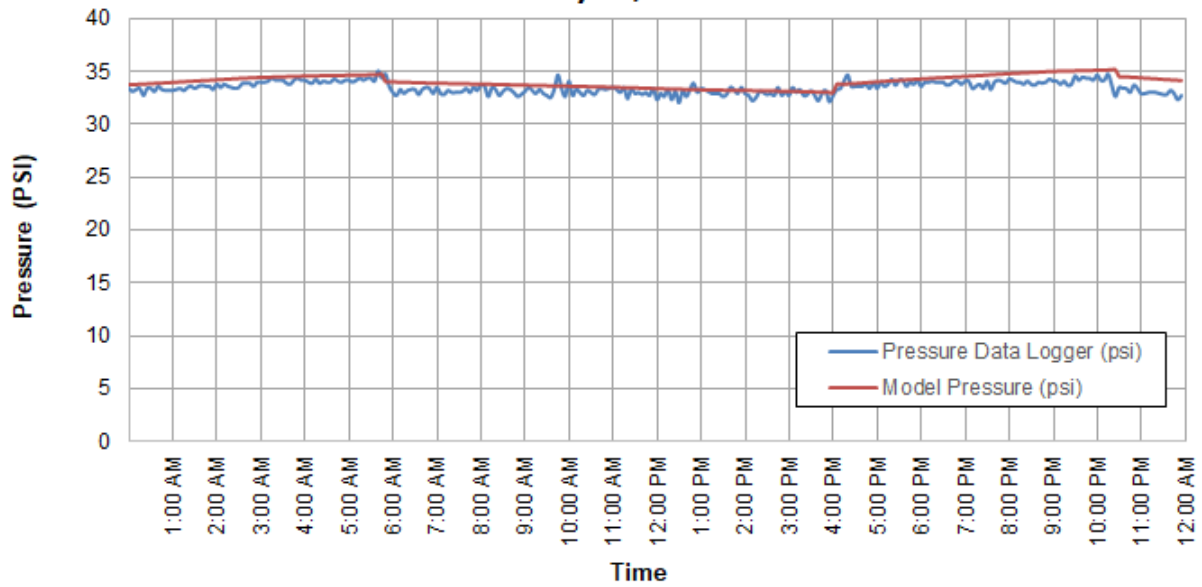
Pressure Data Logger 28 (J-1114), Zone 5
July 28, 2022



**Pressure Data Logger 29 (J-1000), Zone 5
July 28, 2022**



**Pressure Data Logger 30 (J-1227), Zone 5
July 28, 2022**





City of Monterey Park - Water Master Plan (Nov. 2023)

City of Monterey Park - Water Master Plan (Nov. 2023)

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