



**WEST VALLEY WATER DISTRICT  
855 W. Base Line Road Rialto, CA**

**ENGINEERING, OPERATIONS AND PLANNING COMMITTEE MEETING  
AGENDA**

**WEDNESDAY, FEBRUARY 12, 2020 - 6:00 PM**

**NOTICE IS HEREBY GIVEN** that West Valley Water District has called a meeting of the Engineering and Planning Committee to meet in the Administrative Conference Room, 855 W. Base Line Road, Rialto, CA 92376.

- 1. CONVENE MEETING**
- 2. PUBLIC PARTICIPATION**

*The public may address the Board on matters within its jurisdiction. Speakers are requested to keep their comments to no more than three (3) minutes. However, the Board of Directors is prohibited by State Law to take action on items not included on the printed agenda.*

**3. DISCUSSION ITEMS**

- a. Updates to Engineering, Operations and Planning Committee
- b. Approval of Water Facilities Master Plan and 5-Year Capital Improvement Program. **(Pg. 3)**
- c. Review 2012 Capacity Charge Study Based on the 2012 Water Master Plan. **(Pg. 186)**
- d. Consider Water System Infrastructure Installation and Conveyance Agreement with MV AMCV, LLC for Arrowhead Meadows Tract No. 18827. **(Pg. 203)**
- e. Consider Grant of Easement from SC Fontana Development Company, LLC for Tract Nos. 17039 and 17039-1. **(Pg. 229)**
- f. Consider Purchasing Meter Box Lids as Part of the Automatic Meter Reading (AMR) Project from Western Water Works Supply Company. **(Pg. 246)**
- g. Consider an Agreement with ERS Industrial Services, Inc. for FBR Filter Underdrain Repair Project. **(Pg. 257)**
- h. Consider Repairing Reservoir 3-A-1 Joints from RSH Construction Services. **(Pg. 272)**
- i. Lytle Development Company Facilities District Agreement
- j. Rialto-Colton Basin Groundwater Council Agreement
- k. San Bernardino Basin Area Groundwater Council Agreement

1. Mid-Year Budget Review

4. **ADJOURN**

**DECLARATION OF POSTING:**

**I declare under penalty of perjury, that I am employed by the West Valley Water District and posted the foregoing Engineering, Operations and Planning Committee Agenda at the District Offices on February 7, 2020.**



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**Crystal L. Escalera, Board Secretary**





**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** APPROVAL OF WATER FACILITIES MASTER PLAN AND 5-YEAR CAPITAL IMPROVEMENT PROGRAM

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**BACKGROUND:**

The purpose of a Water Facilities Master Plan (“Plan”) is to determine the future water demands and supply requirements, and to identify the water facilities needed to produce, deliver, store and transport that supply to West Valley Water District’s (“District”) customers. The facilities are evaluated based on the projected highest water usage day when the District’s service area is fully developed or built out. The Plan is a living document that is generally updated every five years.

The Akel Engineering Group, Inc. is the consultant that updated the Plan. In support of their planning effort, they created and calibrated a hydraulic water model of the District’s distribution system utilizing existing Geographic Information System (“GIS”) data provided by the District. Existing customer water demands were provided to the consultant and were geographically distributed within the model according to service addresses to enable them to perform an extended period simulation of the system.

Pipeline sizes were evaluated for their ability to convey flows, reservoirs were evaluated for storage adequacy by pressure zone and pump stations were evaluated on their ability to boost required flows. This evaluation was performed for both the existing facilities within the distribution system and for future demands to ensure that recommended facilities are sufficiently sized. Future water demands were distributed according to undeveloped areas within the District’s service area, their projected land use based on the latest General Plans of the Cities and County areas and by updated water unit factors.

**DISCUSSION:**

Attached for your review, approval and eventual adoption is the draft 2019 Water Facilities Master Plan and 5-year Capital Improvement Program in **Exhibit A**. The following are highlights of the Plan:

- The water demand projections used for ultimate build-out of the District are based on land uses from the latest General Plan Land Use maps from the Cities of Rialto, Fontana,

Colton and Counties of San Bernardino and Riverside. Actual consumption data for the various land uses were extracted from District billing information and used to project future water demands. As a result, future water demands are lower than those projected in the previous Water Master Plan.

- The calculated water use rate per Equivalent Dwelling Unit (EDU) is 670 gallons per day (gpd). This usage reflects a decrease in consumption from the previous Water Master Plan, which utilized 750 gpd per EDU. Future demands are expected to decrease based upon water conservation programs employed by the District, by regional incentive programs, water conserving fixtures/appliances, Green Building Codes, new ordinances/laws, and general education of the public.
- The projected development within the District will require a large investment in new infrastructure. This study analyzes this future development and identifies the facilities needed to serve it. Residential lands are currently built to 59 percent of the proposed land use capacity, while non-residential lands are developed to 75 percent of the proposed capacity. Thus, approximately 66 percent of the overall land is built out.
- Future water supplies will include additional groundwater, State Water Project water and purchased groundwater. This will require the District to drill additional wells, expand treatment capabilities at the Oliver P. Roemer Water Filtration Facility, install wellhead treatment, and enter into additional agreements for purchased groundwater supplies.
- A 5-year and a long-term (build-out) capital improvement program (“CIP”) was prepared to address facility replacement and recommended projects to support future growth. The 5-year CIP cost summary can be found in table ES.1 and the identified projects with costs and improvement phasing can be found in Table 8.7.

The Plan will enable the District to strategize planning and budgeting efforts and to implement water system improvements that will maintain a high level of distribution reliability and efficiency for current demands, future growth, and emergency situations.

**FISCAL IMPACT:**

No fiscal impact.

**STAFF RECOMMENDATION:**

It is recommended that the Engineering, Operations and Planning Committee approve the Final Draft of the 2019 Water Facilities Master Plan and have this item considered by the full Board of Directors at a future meeting.

Respectfully Submitted,



---

Clarence Mansell Jr, General Manager

LJ:ce

**ATTACHMENT(S):**

1. Exhibit A - Final Draft of the 2019 Water Facilities Master Plan

# EXHIBIT A



**West Valley  
Water District**

**FINAL DRAFT**



September 2019

# Water Facilities Master Plan



WEST VALLEY WATER DISTRICT

2019

**WATER FACILITIES  
MASTER PLAN**

Final Draft (Revised)

September 2019

**A K E L**  
ENGINEERING GROUP, INC.



September 30, 2019

West Valley Water District  
855 W. Base Line Road  
Rialto, CA 92377

Attention: Linda Jadeski  
Engineering Services Manager

**Subject: 2019 Water Facilities Master Plan – Final Draft Report**

Dear Linda:

We are pleased to submit this final draft report for the West Valley Water District Water Facilities Master Plan. This master plan is a standalone document intended to plan the orderly and phased growth of the water system. The master plan documents the following:

- Existing distribution system facilities, acceptable hydraulic performance criteria, and projected water demands
- Development and calibration of the District's GIS-based hydraulic water model.
- Capacity evaluation of the existing water system with improvements to mitigate existing deficiencies and to accommodate future growth.
- Capital Improvement Program (CIP) with an opinion of probable construction costs and suggestions for cost allocations to meet AB 1600.
- Potable water supply and regulations completed by Kleinfelder, Inc.

We extend our thanks to you, and other District staff whose courtesy and cooperation were valuable components in completing this study.

Sincerely,

AKEL ENGINEERING GROUP, INC.

Tony Akel, P.E.  
Principal

Enclosure: Report





## Acknowledgements

### Board of Directors

**Dr. Michael Taylor**, President

**Mr. Kyle Crowther**, Vice President

**Dr Clifford O. Young, Sr.**

**Mr. Greg Young**

**Mr. Donald Olinger**

### District Staff

**Mr. Clarence Mansell, Jr**, General Manager

**Mr. Ricardo Pacheco**, Assistant General Manager

**Ms. Linda Jadeski**, Engineering Services Manager

**Ms. Joanne Chan**, Operations Manager

**Mr. Joe Schaack**, Production Supervisor

**Other District Engineering and Operations Staff**



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- Appendix B OPR Facility Flow Schematic
- Appendix C Hydraulic Model Calibration

### EXECUTIVE SUMMARY

The purpose of this Water Facilities Master Plan is to determine the future water demands and supply requirements for West Valley Water District (District) and to identify the water facilities needed to produce, deliver, store and transport this supply to its customers. The facilities are based on the projected highest water usage day, when the District is fully developed.

This executive summary presents a brief background of the District's water distribution system, the planning area characteristics, the system performance and design criteria, the hydraulic model, and a capital improvement program. A hydraulic model of the District's existing water distribution system was created and used to evaluate the capacity adequacy of the existing distribution system and to recommend improvements to mitigate existing deficiencies, as well as servicing future growth.

The highlights of this Water Facilities Master Plan are listed as follows:

1. The water demand projections used for ultimate build-out of the District are based on land uses from the latest General Plan Land Use maps from the Cities of Rialto, Fontana, Colton and Counties of San Bernardino and Riverside. Actual consumption data for the various land uses were extracted from District billing information and used to project future water demands. As a result, future water demands are lower than those projected in the previous Water Master Plan.
2. The calculated water use rate per Equivalent Dwelling Unit (EDU) is 670 gallons per day (gpd). This usage reflects a decrease in consumption from the previous Water Master Plan, which utilized 750 gpd per EDU. Future demands are expected to decrease based upon water conservation programs employed by the District, by regional incentive programs, water conserving fixtures/appliances, Green Building Codes, new ordinances/laws, and general education of the public.
3. The projected development within the District will require a large investment in new infrastructure. This study analyzes this future development and identifies the facilities needed to serve it. Residential lands are currently built to 59 percent of the proposed land use capacity, while non-residential lands are developed to 75 percent of the proposed capacity. Thus, approximately 66 percent of the overall land use plan is built out.
4. Future water supplies will include additional groundwater, State Water Project (SWP) water and purchased groundwater. This will require the District to drill additional wells, expand treatment capabilities at the Oliver P. Roemer Water Filtration Facility (WFF), install wellhead treatment, and enter into additional agreements for purchased groundwater supplies.



5. To meet the ultimate peak day water demands, the District will have to expand treatment capabilities at the Oliver P. Roemer Water Filtration Facility (WFF) to maximize the use of State Water Project (SWP) water, drill new wells in the Bunker Hill groundwater basin and construct the reservoirs and pump stations needed to support these wells. The following 5-year Capital Improvement Projects are recommended:
- Construct the expansion of the Oliver P. Roemer Water Filtration Facility.
  - Drilling four new wells in the Bunker Hill Basin.
  - Install wellhead treatment or create blending plans for existing wells.
  - Construct Reservoir R8-3.
  - Construct Booster Pump Station 4-3, 7-2 and a new Bunker Hill pump station.
  - Construct new transmission pipelines and replace aging pipelines.
  - Acquire property for needed facilities.

## ES.1 STUDY OBJECTIVES

The District recognizes the importance of planning, developing, and financing the District's water system infrastructure. As such, District staff initiated an update to the Water Facilities Master Plan, most recently completed in 2012. This master plan included the following tasks:

- Summarizing the District's existing domestic water system facilities
- Documenting growth planning assumptions and known future developments
- Updating the domestic water system performance criteria
- Projecting future domestic water demands
- Creating and calibrating a new hydraulic model using Geographic Information Systems (GIS) data
- Evaluating the domestic water facilities to meet existing and projected demand requirements and fire flows
- Evaluating the existing groundwater conditions
- Performing a capacity analysis for major distribution mains
- Performing a fire flow analysis
- Recommending a capital improvement program (CIP) with an opinion of probable costs for 5-year and buildout growth
- Performing a capacity allocation analysis for cost sharing purposes

## ES.2 STUDY AREA

The District provides domestic water service to customers throughout southwestern San Bernardino County and a small portion of northern Riverside County, as part of the greater San Bernardino-Riverside-Ontario metropolitan area. The service area, approximately 50 miles east of downtown Los Angeles, is generally bounded by U.S. Forest Service land to the north and Riverside County to the south, with the cities of San Bernardino and Colton serving as the eastern boundaries and the City of Fontana as the western boundary (Figure ES.1). The District Sphere of Influence encompass 18,076 acres, serving over 80,000 residents.

## ES.3 SYSTEM PERFORMANCE AND DESIGN CRITERIA

This report documents the District's performance and design criteria that were used for evaluating the domestic water system. The system performance and design criteria are used to establish guidelines for determining future water demands, evaluating existing domestic water facilities, and for sizing future facilities. Chapter 3 discusses the system performance and design criteria for the domestic water system.

## ES.4 EXISTING WATER SYSTEM OVERVIEW

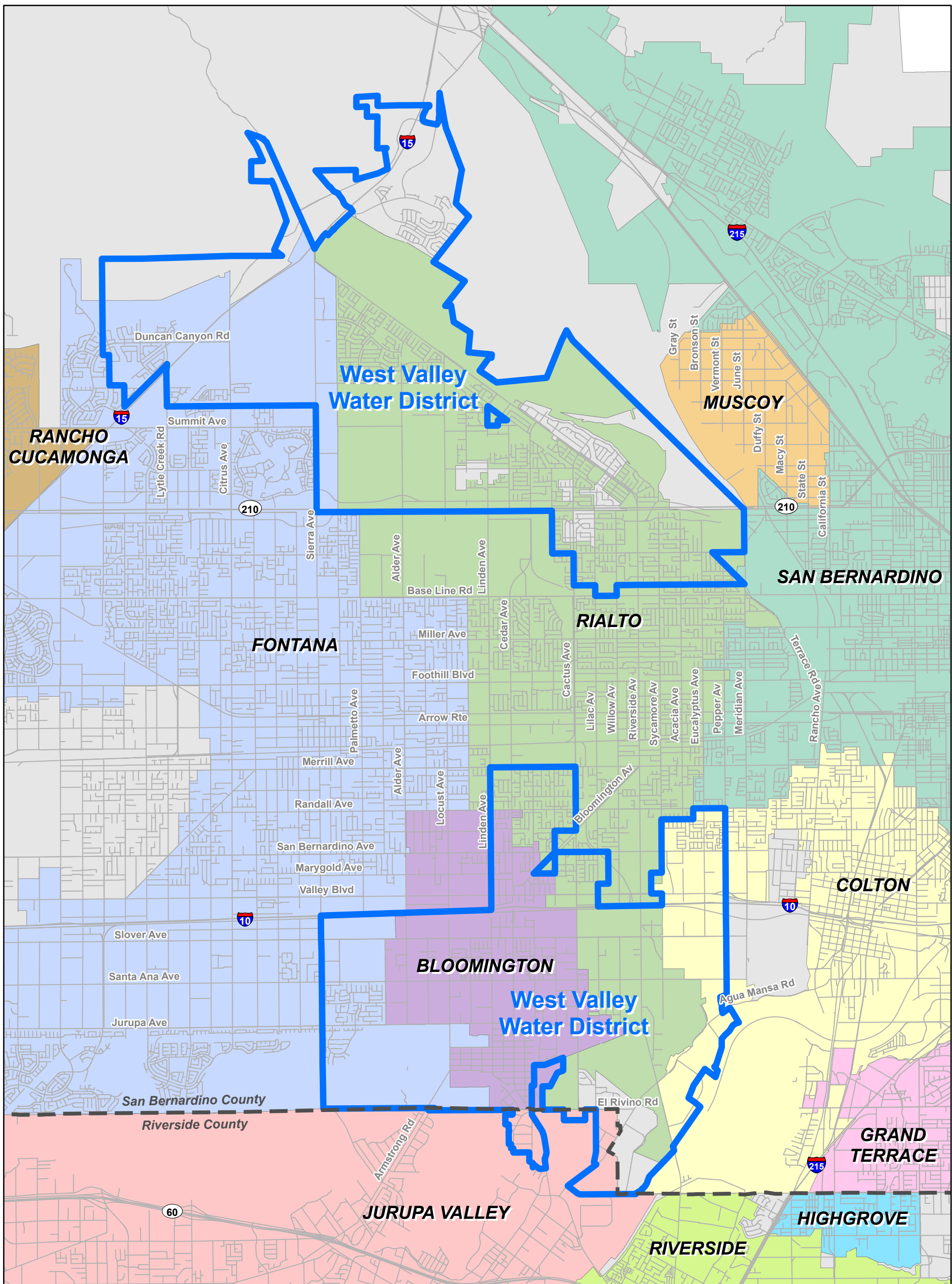
The District utilizes multiple sources of drinking water supply to serve its existing customers. The water distribution system is generally divided into two sections, commonly referred to as the North System and the South System. The existing water distribution is shown graphically on Figure ES.2, with a general color coding for the distribution mains as well as labeling the existing booster stations, valve stations, storage reservoirs, and supply facilities. Booster stations and valve stations are used to convey water between the District's multiple pressure zones, with storage tanks providing additional water supply for operational and emergency purposes.

## ES.5 EXISTING AND FUTURE DOMESTIC WATER DEMANDS

The existing water demands used for this master plan were based on the District's water billing consumption records and adjusted to match the annual production records and account for system loss. Additionally, future demands were developed based on known development expected to occur within the next five years as well as the expected buildout development identified by the counties of San Bernardino and Riverside.

## ES.6 WATER SUPPLY PLANNING

In order to meet the existing domestic water demands the District utilizes several sources of supply, including groundwater and treated surface water. The District's existing wells extract groundwater from one of the following groundwater basins: Lytle Creek Basin, Bunker Hill Basin, Rialto-Colton Basin, Chino Basin, and Riverside-Arlington Basin. The District also treats the following two sources of surface water at the Oliver P. Roemer Water Filtration Facility (Roemer Water Filtration Facility): Lytle Creek and State Water Project.



**Legend**

- WVWD Service Area
- County Boundaries
- City Boundaries**
- Jurupa Valley
- Muscoy
- Bloomington
- Rancho Cucamonga
- Colton
- Rialto
- Fontana
- Riverside
- Grand Terrace
- San Bernardino
- Highgrove
- Unincorporated Area
- Street Centerlines

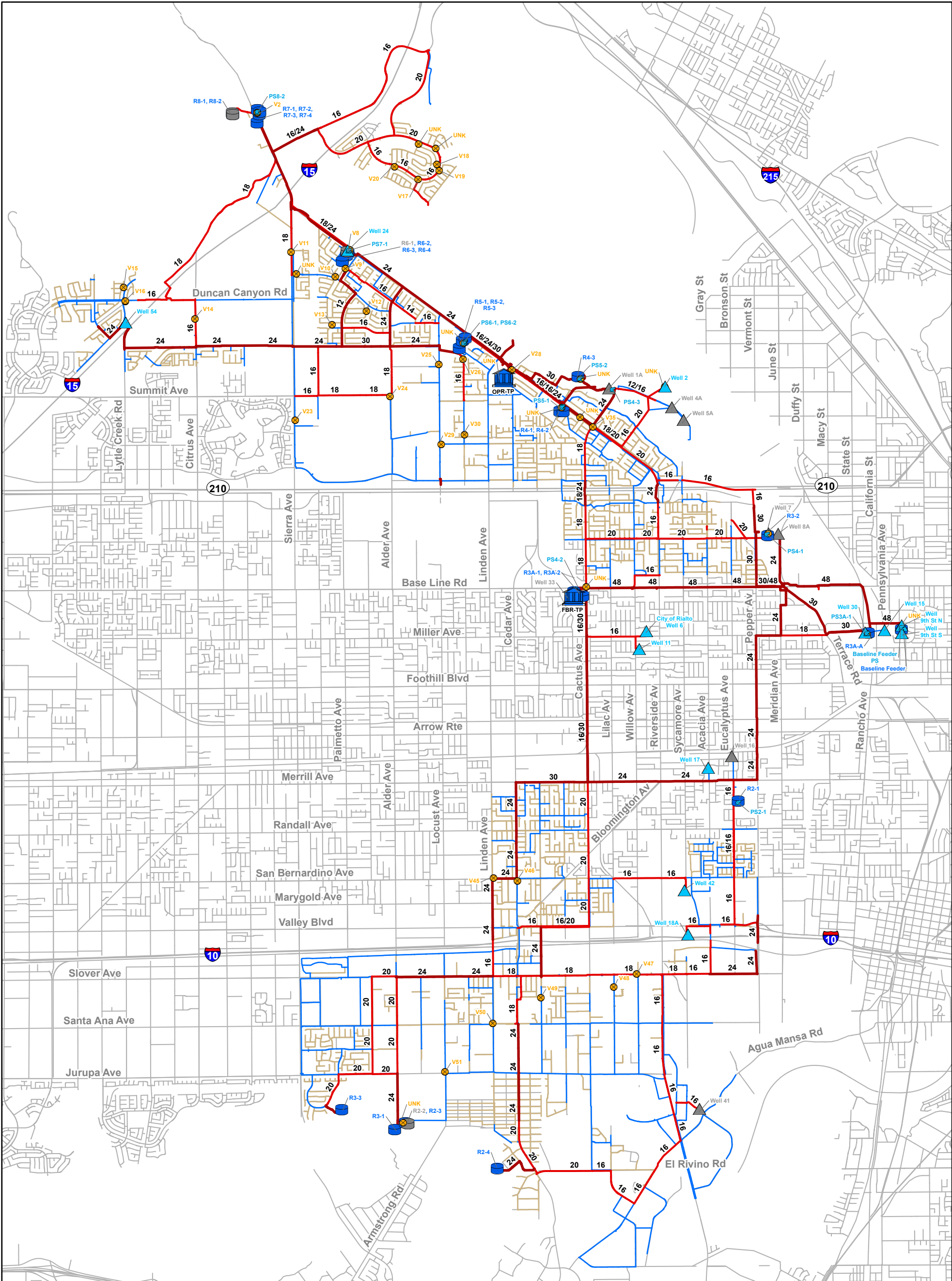
**PRELIMINARY**

**ES.1**  
**WVWD Service Area**  
**and Surrounding Cities**

Water Facilities Master Plan  
 West Valley Water District







- Legend**
- Existing System**
  - WTP
  - Tanks
  - Inactive Tanks
  - Active Wells
  - Inactive Wells
  - Pumps
  - Valves
  - Pipes by Diameter
    - 8" and Smaller
    - 10" - 12"
    - 16" - 20"
    - 24" - 48"
  - Street Centerlines

**PRELIMINARY**

**ES.2**  
**Existing Water Distribution System**  
 Water Facilities Master Plan  
 West Valley Water District



Updated: March 13, 2019

0 0.25 0.5 1 Mile



File Path: P:\GIS\GIS\_Projects\West Valley WDW\WVD\_ES-2\_ExistingSystem\_031319.mxd

In order to meet the growing demand requirements of the District service area and provide additional water supply reliability, the existing water supply capacity will require expansion; this expansion is

planned to include the rehabilitation of existing groundwater wells, the construction of new groundwater wells, and the expansion of the Roemer Water Filtration Facility.

## ES.7 HYDRAULIC MODEL DEVELOPMENT

Hydraulic network analysis has become an effective and powerful tool in many aspects of water distribution planning, design, operation, management, emergency response planning, system reliability analysis, fire flow analysis, and water quality evaluations. As a part of this master plan a new hydraulic model was developed for the District's water distribution system, combining information on the physical characteristics of the water system (pipelines, groundwater wells, valves, booster stations, and storage reservoirs) and operational characteristics (how they operate). The hydraulic model development process included a thorough verification and calibration process with District staff to ensure the water model was consistent with the existing water distribution system and provided results consistent with real-world conditions.

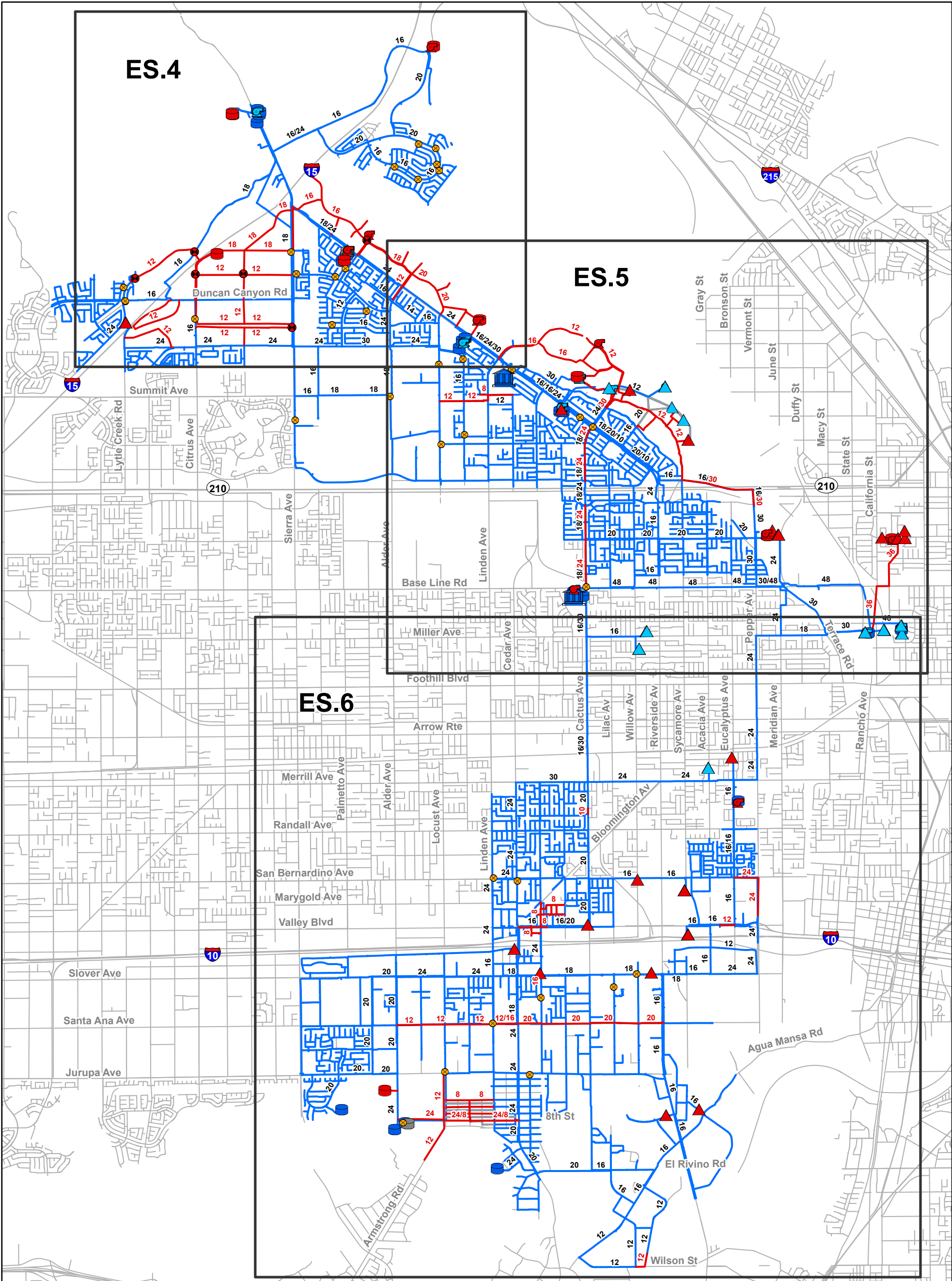
## ES.8 EXISTING SYSTEM EVALUATION

The District's master plan included a hydraulic evaluation of the District's existing water distribution system. This hydraulic evaluation included analyzing the system-wide pressures under various demand conditions comparing the existing storage capacity, booster station capacity, and supply capacity to the required amounts based on the master plan performance criteria. The District's existing system is generally able to meet the system performance criteria under existing conditions. Improvements will be recommended to mitigate the deficiencies identified as part of the evaluation.

## ES.9 CAPITAL IMPROVEMENT PROGRAM

The Capital Improvement Program includes improvements consistent with ongoing projects planned by the District as well as improvements recommended for mitigating existing system deficiencies and servicing future growth. [Figure ES.3](#) through [Figure ES.6](#) document the recommended improvements. For budgeting purposes, the District included a 5-year improvement prioritization plan, and which is summarized in [Table ES.1](#). A more detailed cost summary for the 5-year plan, as well as the buildout improvements, are documented in Chapter 8. As shown on [Table ES.1](#), the total cost over the 5-year horizon is approximately 159.1 million dollars.





**Legend**

- |                            |                        |                    |
|----------------------------|------------------------|--------------------|
| <b>System Improvements</b> | <b>Existing System</b> | Inactive Tanks     |
| Tanks                      | WTP                    | Abandoned Pipes    |
| Wells                      | Tanks                  | Street Centerlines |
| Pumps                      | Wells                  |                    |
| Valves                     | Pumps                  |                    |
| Pipes                      | Valves                 |                    |
|                            | Pipes                  |                    |

**PRELIMINARY**

**ES.3**  
**Future Improvements**  
**Keymap**  
 Water Facilities Master Plan  
 West Valley Water District



Updated: December 4, 2018 1 Mile

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**Legend**

**System Improvements**

- Tanks
- Wells
- Pumps
- Valves
- Pipes

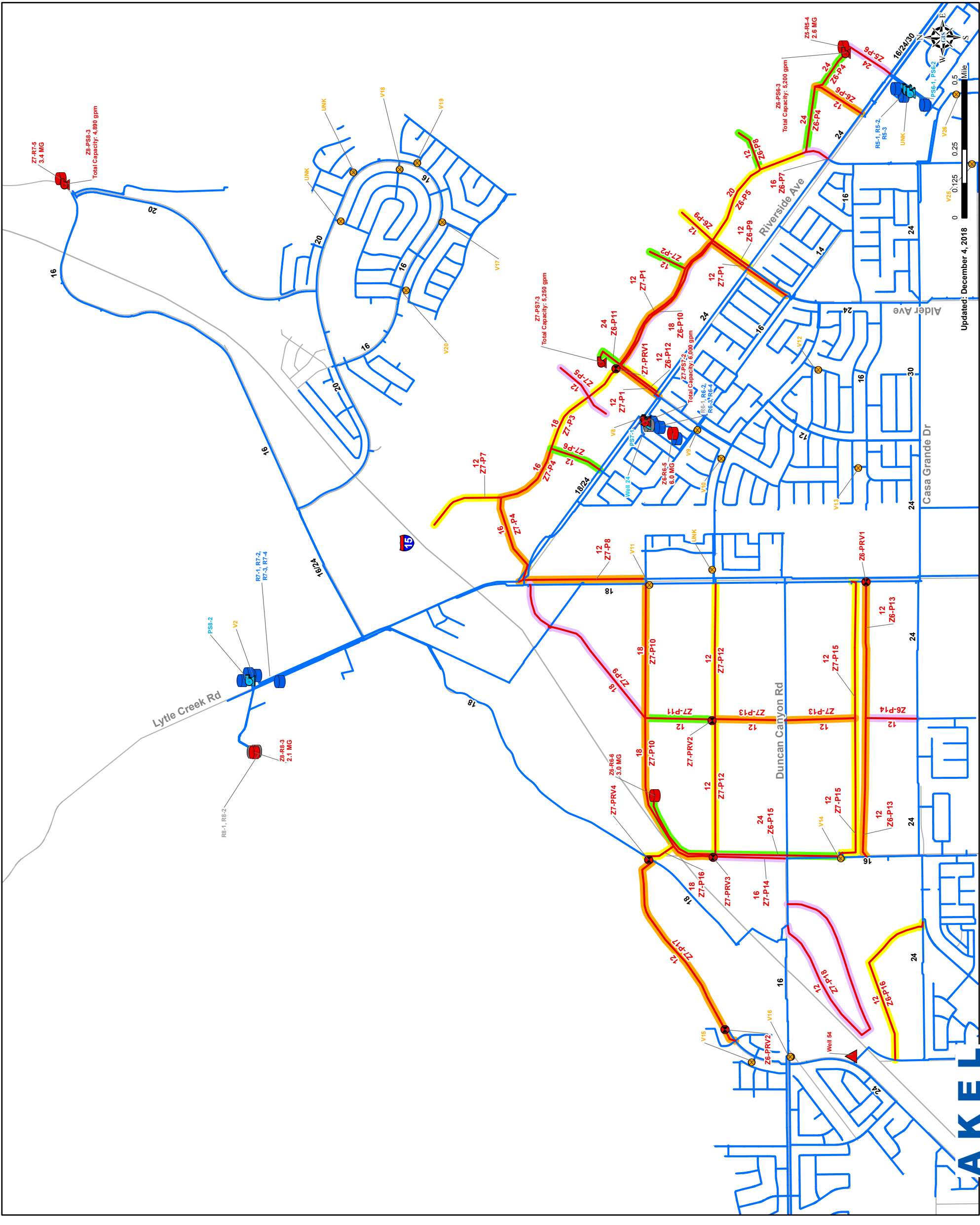
**Existing System**

- WTP
- Tanks
- Wells
- Pumps
- Valves
- Pipes
- Inactive Tanks
- Abandoned Pipes
- Street Centerlines

**Note:**  
Pipe highlighting indicates limits of individual segments as identified in the CIP table.

**PRELIMINARY**

**ES.4**  
**Future Improvements**  
Water Facilities Master Plan  
West Valley Water District



Updated: December 4, 2018  
Scale: 0, 0.125, 0.25, 0.5 Miles  
File Path: P:\GIS\GIS\_P\Projects\West Valley\WDM\ES-4\_FutureImprovements\_NorthWest\_C01819.mxd



### Legend

#### System Improvements

- Tanks
- Wells
- Pumps
- Valves
- Pipes

#### Existing System

- WTP
- Tanks
- Wells
- Pumps
- Valves
- Pipes
- Inactive Tanks
- Abandoned Pipes
- Street Centerlines

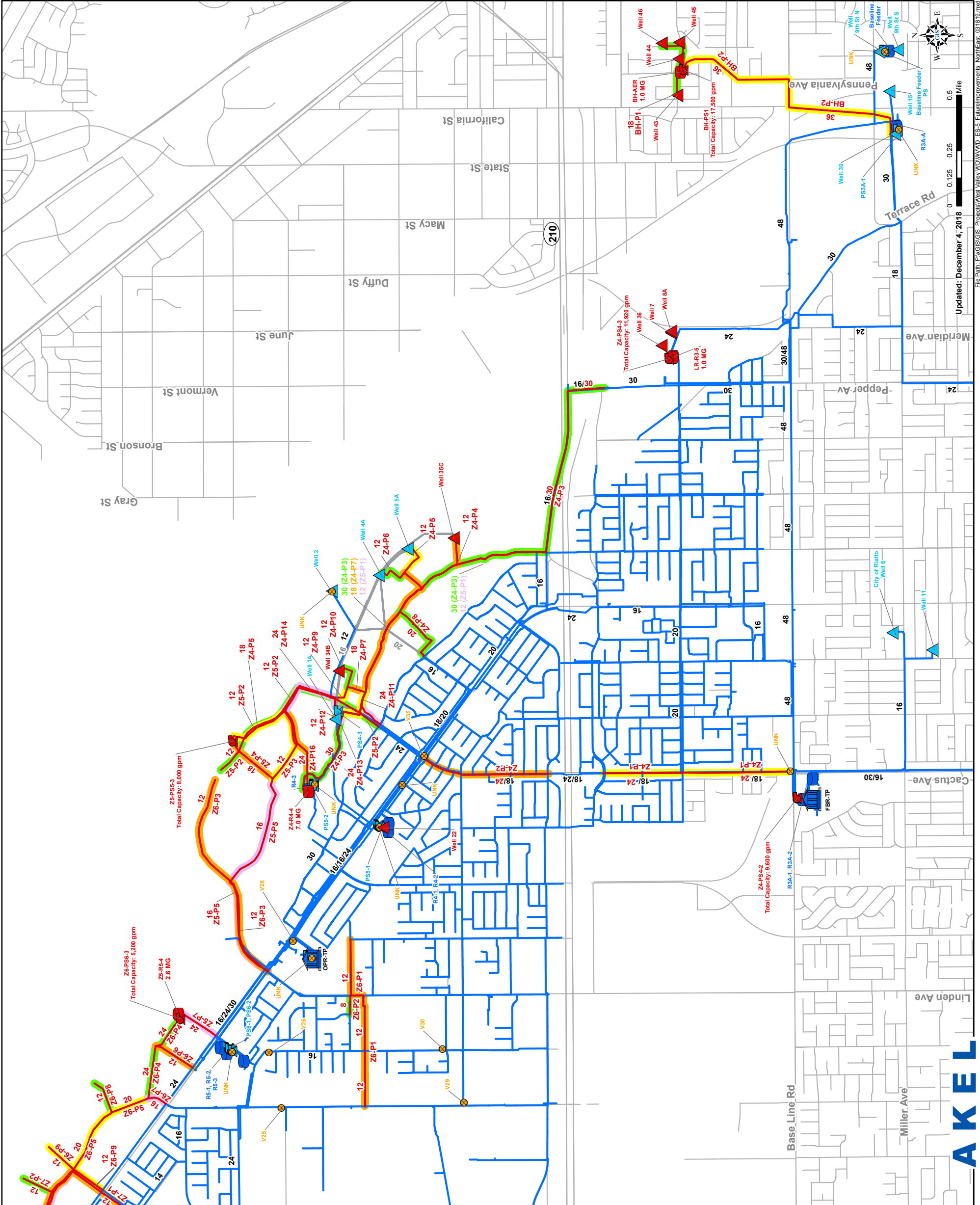
Note: Pipe highlighting indicates limits of individual segments as identified in the CIP table.

## PRELIMINARY

### ES.5

#### Future Improvements

Water Facilities Master Plan  
West Valley Water District



Updated: December 4, 2018  
 File Path: Proj\GIS\GIS - Projects\West Valley\WV\WV\ES-5\_FutureImprovements\_NorthEast\_031819.mxd

**AKEL**  
 ENGINEERING GROUP, INC.



### Legend

- System Improvements**
- Tanks
  - Wells
  - Pumps
  - Valves
  - Pipes

### Existing System

- WTP
- Tanks
- Wells
- Pumps
- Valves
- Pipes
- Inactive Tanks
- Abandoned Pipes
- Street Centerlines

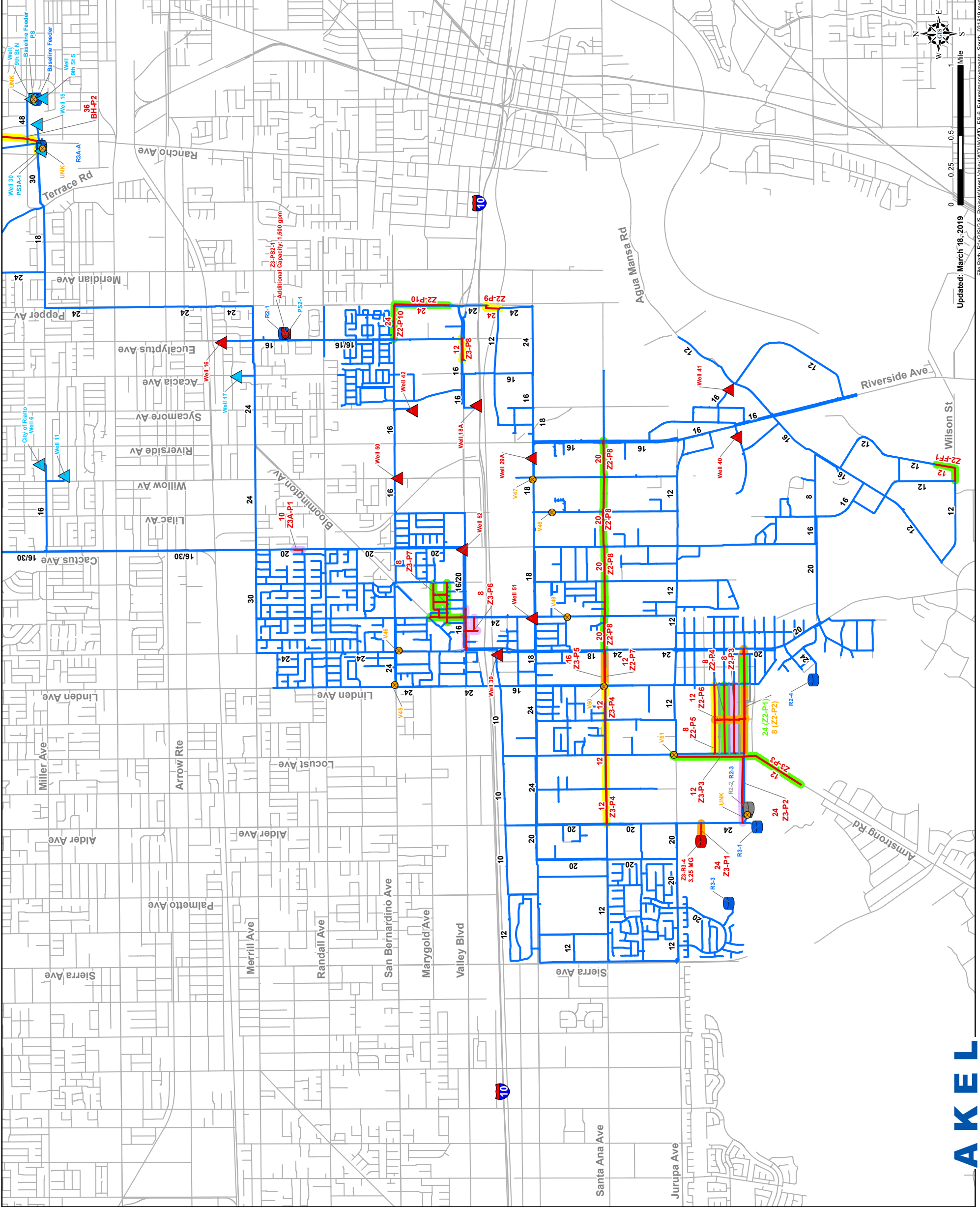
**Note:**  
Pipe highlighting indicates limits of individual segments as identified in the CIP table.

**PRELIMINARY**

## ES.6

### Future Improvements

Water Facilities Master Plan  
West Valley Water District



**Table ES.1 5-Year CIP Summary**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Fiscal Year	Existing Users		Future Users		Combined Project Costs	
	Fiscal Year Total (\$)	Cumulative Total (\$)	Fiscal Year Total (\$)	Cumulative Total (\$)	Fiscal Year Total (\$)	Cumulative Total (\$)
2018/19	\$2,528,000	\$2,528,000	\$6,207,000	\$6,207,000	\$8,735,000	\$8,735,000
2019/20	\$14,163,200	\$16,691,200	\$80,106,920	\$86,313,920	\$94,270,120	\$103,005,120
2020/21	\$1,766,000	\$18,457,200	\$25,858,000	\$112,171,920	\$27,624,000	\$130,629,120
2021/22	\$5,364,500	\$23,821,700	\$3,523,000	\$115,694,920	\$8,887,500	\$139,516,620
2022/23	\$6,001,000	\$29,822,700	\$7,073,000	\$122,767,920	\$13,074,000	\$152,590,620
2023/24	\$0	\$29,822,700	\$6,469,000	\$129,236,920	\$6,469,000	\$159,059,620
<b>Total Improvement Cost</b>		<b>\$29,822,700</b>		<b>\$129,236,920</b>		<b>\$159,059,620</b>



4/5/2019

# 2019

## West Valley Water District

### CHAPTER 1 - INTRODUCTION

This chapter provides a brief background of the District's domestic water system, the need for this master plan, and the objectives of the study. Abbreviations and definitions are also provided in this chapter.

#### 1.1 BACKGROUND

The West Valley Water District (District) provides domestic water service to customers throughout southwestern San Bernardino County and a small portion of northern Riverside County, as part of the greater San Bernardino-Riverside-Ontario metropolitan area. The service area, approximately 50 miles east of downtown Los Angeles, generally includes the cities of Fontana, Rialto, Colton, Jurupa Valley, Bloomington, and other unincorporated areas of San Bernardino County ([Figure 1.1](#)). The District provides potable water service to more than 80,000 residents, as well as a myriad of commercial, industrial, and institutional establishments. The District operates a domestic water distribution system that consists of 21 groundwater wells, 25 separate storage reservoirs across eight pressure zones, for a total storage over 72 million gallons (MG), and over 375 miles of transmission and distribution pipelines.

In 2012, the District developed a Water System Master Plan that identified capacity deficiencies in the existing water system and recommended improvements to alleviate existing deficiencies and serve future developments inside the District's service area. Recognizing the importance of planning, developing, and financing system facilities to provide reliable water service to existing customers and for servicing anticipated growth within the service area, the District initiated updating elements of the 2012 Water System Master Plan, to reflect current land use conditions.

#### 1.2 SCOPE OF WORK





The District approved Akel Engineering Group Inc. to prepare this 2019 Water Facilities Master Plan (WFMP) in May of 2017. This 2019 WFMP is intended to serve as a tool for planning and phasing the construction of future domestic water system infrastructure for the projected buildout of the service area. The 2019 WFMP evaluates the District's water system and recommends capacity improvements necessary to service the needs of existing users and for servicing the future growth of the District.

The service area and horizon for the master plan are reflective of the cumulative growth associated with the differing municipalities serviced by the District. Should planning conditions change, and depending on their magnitude, adjustments to the master plan recommendations might be necessary.

This master plan included the following tasks:

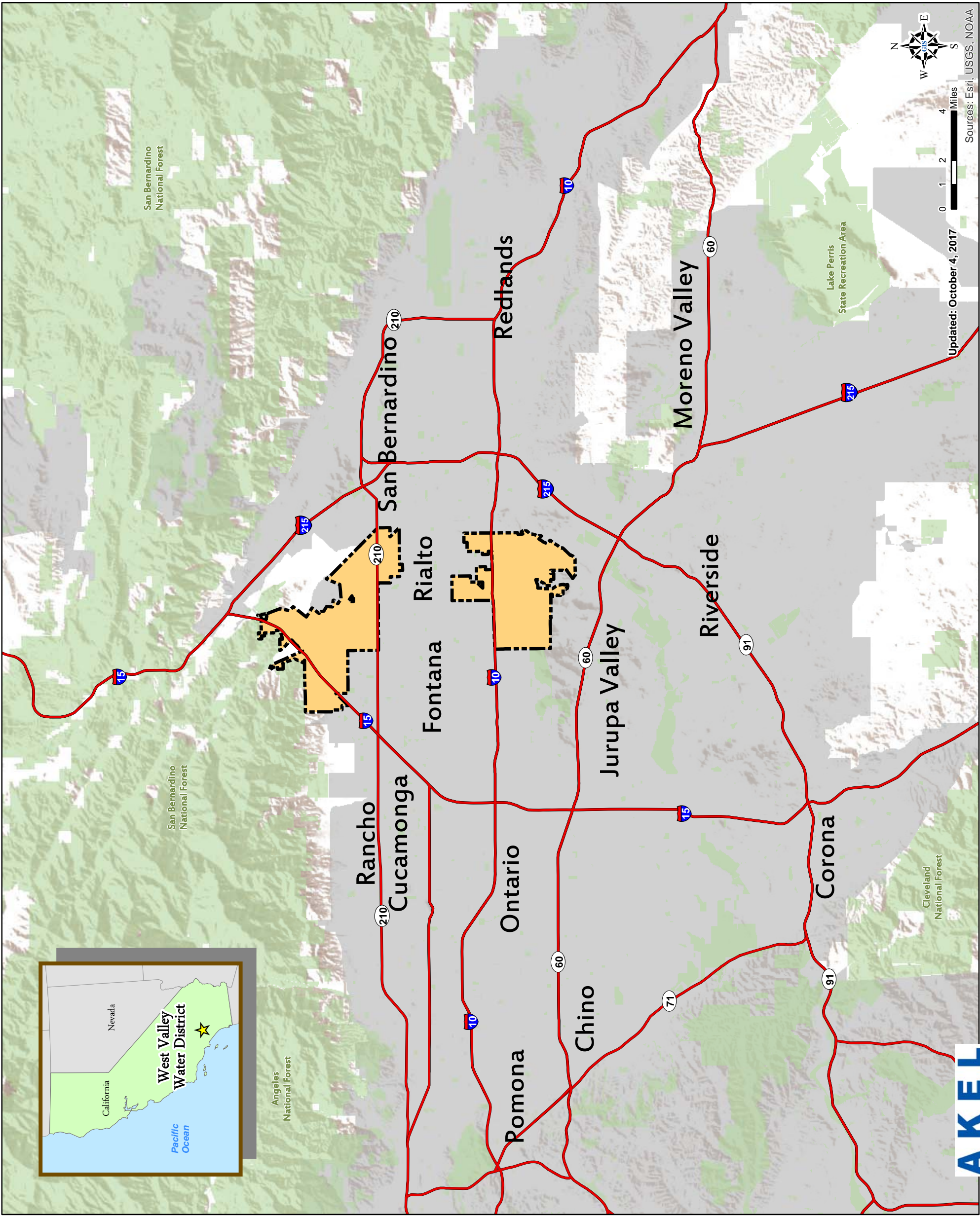


**Legend**

-  Major Highways
-  West Valley Water District
-  Urbanized Area
-  Protected Open Space

**PRELIMINARY**

**Figure 1.1**  
**Regional Location Map**  
 Water Facilities Master Plan  
 West Valley Water District



Updated: October 4, 2017  
 Sources: Esri, USGS, NOAA  
 File Path & Name: P:\GIS\GIS - Projects\West Valley WDW\WVD\_Fig1-1\_RLM\_100417.mxd



- Summarizing the District's existing domestic water system facilities
- Documenting growth planning assumptions and known future developments
- Updating the domestic water system performance criteria
- Projecting future domestic water demands
- Creating and calibrating a new hydraulic model using Geographic Information Systems (GIS) data
- Evaluating the domestic water facilities to meet existing and projected demand requirements and fire flows
- Evaluating the existing groundwater conditions
- Performing a capacity analysis and fire flow analysis for distribution mains
- Recommending a capital improvement program (CIP) with an opinion of probable costs for 5-year and buildout growth
- Performing a capacity allocation analysis for cost sharing purposes

### 1.3 PREVIOUS MASTER PLANS

The District's most recent water master plan was completed in 2012. This master plan included an evaluation of servicing growth throughout the Sphere of Influence, evaluated existing demands and projected future demands, recommended phased improvements as part of a 5 year capital improvement program, and identified pumping and storage requirements for the buildout of the Sphere of Influence.

### 1.4 RELEVANT REPORTS

The District has completed several special studies intended to evaluate localized growth. These reports were referenced and used during the preparation of 2019 WFMP. The following lists relevant reports that were used in the completion of this master plan, as well as a brief description of each document:

- [2012 Water Master Plan, August 2012. \(2012 WMP\)](#). This report documents the water demand projection and provides an update to the Capital Improvement Program, through the evaluation of the existing water system.
- [2015 San Bernardino Valley Regional Urban Water Management Plan](#). The District participated in the 2015 San Bernardino Valley Regional Urban Water Management Plan (RUWMP), which established a benchmark per capita water usage and targets in order to achieve higher levels of water conservation for the sustainability of water supply sources. This included adopting an updated water shortage contingency plan, defining supply sources, addressing supply reliability, and projecting sustainable supply yields and future demands.



- **Draft 2017 Lytle Creek Ranch Water Facilities Feasibility Study.** This report documents the preliminary water facility requirements for the buildout of the Lytle Creek Ranch Specific Plan. This report includes demand projections for the buildout of the Lytle Creek Ranch development and documents preliminary pipeline alignments as well as pump station and storage reservoir sizes and locations. Additionally, preliminary project costs are documented for the required water facility improvements.

## 1.5 REPORT ORGANIZATION

The water system master plan report contains the following chapters:

**Chapter 1 - Introduction.** This chapter provides a brief background of the District's domestic water system, the need for this master plan, and the objectives of the study. Abbreviations and definitions are also provided in this chapter.

**Chapter 2 - Planning Areas Characteristics.** This chapter presents a discussion of the planning area characteristics for this master plan and defines the land use classifications. The planning area is divided into several planning sub-areas, as established by the various city and county general plans.

**Chapter 3 - System Performance and Design Criteria.** This chapter presents the District's performance and design criteria, which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed distribution mains, storage reservoirs, pump stations and wells.

**Chapter 4 - Existing Domestic Water Facilities.** This chapter provides a description of the District's existing domestic water system facilities including the distribution mains, storage reservoir, booster pump stations and the existing wells.

**Chapter 5 - Water Demands and Supply Characteristics.** This chapter summarizes existing domestic water demands, discussed available supply characteristics, and projects the future domestic water demands.

**Chapter 6 - Hydraulic Model Development.** This chapter describes the development and calibration of the District's domestic water distribution system hydraulic model. The hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

**Chapter 7 - Evaluation and Proposed Improvements.** This section presents a summary of the domestic water system evaluation and identifies improvements needed to mitigate existing deficiencies, as well as improvements needed to expand the system and service growth.

**Chapter 8 - Capital Improvement Program.** This chapter provides a summary of the recommended domestic water system improvements to mitigate existing capacity deficiencies and to accommodate anticipated future growth. The chapter also presents the cost criteria and

methodologies for developing the capital improvement program. Finally, a capacity allocation analysis, usually used for cost sharing purposes, is also included.

## 1.6 ACKNOWLEDGEMENTS

Obtaining the necessary information to successfully complete the analysis presented in this report, and developing the long term strategy for mitigating the existing system deficiencies and for accommodating future growth, was accomplished with the strong commitment and very active input from dedicated team members including:

- Ms. Linda Jadeski, Engineering Services Manager
- Ms. Joanne Chan, Operations Manager
- Mr. Joe Schaack, Production Supervisor

## 1.7 UNIT CONVERSIONS AND ABBREVIATIONS

Engineering units were used in reporting flow rates and volumes pertaining to the design and operation of various components of the domestic water distribution system. Where it was necessary to report values in smaller or larger quantities, different sets of units were used to describe the same parameter. Values reported in one set of units can be converted to another set of units by applying a multiplication factor. A list of multiplication factors for units used in this report is shown on [Table 1.1](#).

Various abbreviations and acronyms were also used in this report to represent relevant water system terminologies and engineering units. A list of abbreviations and acronyms is included in [Table 1.2](#).

## 1.8 GEOGRAPHIC INFORMATION SYSTEMS

This master planning effort made extensive use of Geographic Information Systems (GIS) technology, for completing the following tasks:

- Developing the physical characteristics of the hydraulic model (pipes and junctions, wells, and storage reservoirs)
- Allocating existing water demands, as extracted from the water billing records, and based on each user's physical address.
- Calculating and allocating future water demands, based on future developments water use.
- Extracting ground elevations along the distribution mains from available digital elevation information.
- Generating maps and exhibits used in this master plan.

**Table 1.1 Unit Conversions**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Volume Unit Calculations		
To Convert From:	To:	Multiply by:
acre feet	gallons	325,851
acre feet	cubic feet	43,560
acre feet	million gallons	0.3259
cubic feet	gallons	7.481
cubic feet	acre feet	$2.296 \times 10^{-5}$
cubic feet	million gallons	$7.481 \times 10^{-6}$
gallons	cubic feet	0.1337
gallons	acre feet	$3.069 \times 10^{-6}$
gallons	million gallons	1,000,000
million gallons	gallons	$1 \times 10^{-6}$
million gallons	cubic feet	133,672
million gallons	acre feet	3.069
Flow Rate Calculations		
To Convert From:	To:	Multiply By:
ac-ft/yr	mgd	$8.93 \times 10^{-4}$
ac-ft/yr	cfs	$1.381 \times 10^{-3}$
ac-ft/yr	gpm	0.621
ac-ft/yr	gpd	892.7
cfs	mgd	0.646
cfs	gpm	448.8
cfs	ac-ft/yr	724
cfs	gpd	646300
gpd	mgd	$1 \times 10^{-6}$
gpd	cfs	$1.547 \times 10^{-6}$
gpd	gpm	$6.944 \times 10^{-4}$
gpd	ac-ft/yr	$1.12 \times 10^{-3}$
gpm	mgd	$1.44 \times 10^{-3}$
gpm	cfs	$2.228 \times 10^{-3}$
gpm	ac-ft/yr	1.61
gpm	gpd	1,440
mgd	cfs	1.547
mgd	gpm	694.4
mgd	ac-ft/yr	1,120
mgd	gpd	1,000,000



**Table 1.2 Abbreviations and Acronyms**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Abbreviation	Expansion	Abbreviation	Expansion
2012 WSMP	2012 Water System Master Plan	gpm	gallons per minute
AACE International	Association for the Advancement of Cost Engineering	hp	horsepower
AC	acre	HGL	hydraulic grade line
ACP	Asbestos Cement Pipe	HWL	high water level
ADD	average day demand	in	inch
AF	Acre Feet	LF	linear feet
Akel	Akel Engineering Group, Inc.	MG	million gallons
CCI	Construction Cost Index	MGD	million gallons per day
CDPH	California Department of Public Health	MMD	maximum month demand
cfs	cubic feet per second	NFPA	National Fire Protection Association
CI	cast iron pipe	PDD	peak day demand
CIB	Capital Improvement Budget	PHD	peak hour demand
CIP	Capital Improvement Program	PRV	pressure reducing valve
DIP	Ductile Iron Pipe	psi	pounds per square inch
District	West Valley Water District	ROW	Right of Way
DU	dwelling unit	SBVMWD	San Bernardino Valley Municipal Water District
EDU	equivalent dwelling unit	SCADA	Supervisory Control and Data Acquisition
ENR	Engineering News Record	SCAG	Southern California Association of Governments
EPA	Environmental Protection Agency	SHGL	Static Hydraulic Gradient Line
EPS	Extended Period Simulation	SS	Steady-State
FBR	Fluidized Bed Reactor	SOI	Sphere of Influence
ft	feet	TBD	to be determined
fps	feet per second	ULL	Urban Limit Line
FY	Fiscal Year	WFF	Oliver P. Roemer Water Filtration Facility
GIS	Geographic Information Systems	WFMP	Water Facilities Master Plan
gpd	gallons per day	WTP	Water Treatment Plant
gpcd	gallons per day per capita		



2/9/2018

## CHAPTER 2 - PLANNING AREA CHARACTERISTICS

This chapter presents a discussion of the planning area characteristics for this master plan and defines the land use classifications. The planning area is divided into several planning sub-areas, as established by the various city and county general plans.

### 2.1 STUDY AREA DESCRIPTION

The West Valley Water District provides domestic water service to customers throughout southwestern San Bernardino County and a small portion of northern Riverside County, as part of the greater San Bernardino-Riverside-Ontario metropolitan area. The service area, approximately 50 miles east of downtown Los Angeles, is generally bounded by U.S. Forest Service land to the north and Riverside County to the south, with the cities of San Bernardino and Colton serving as the eastern boundaries and the City of Fontana as the western boundary ([Figure 2.1](#)). The central portion of the City of Rialto divides the District's service area into a northern system and southern system and is served by the City of Rialto. The additional water agencies serving the areas adjacent to the District service area are summarized on [Figure 2.2](#). The District Sphere of Influence encompass 18,076 acres, serving over 80,000 residents.

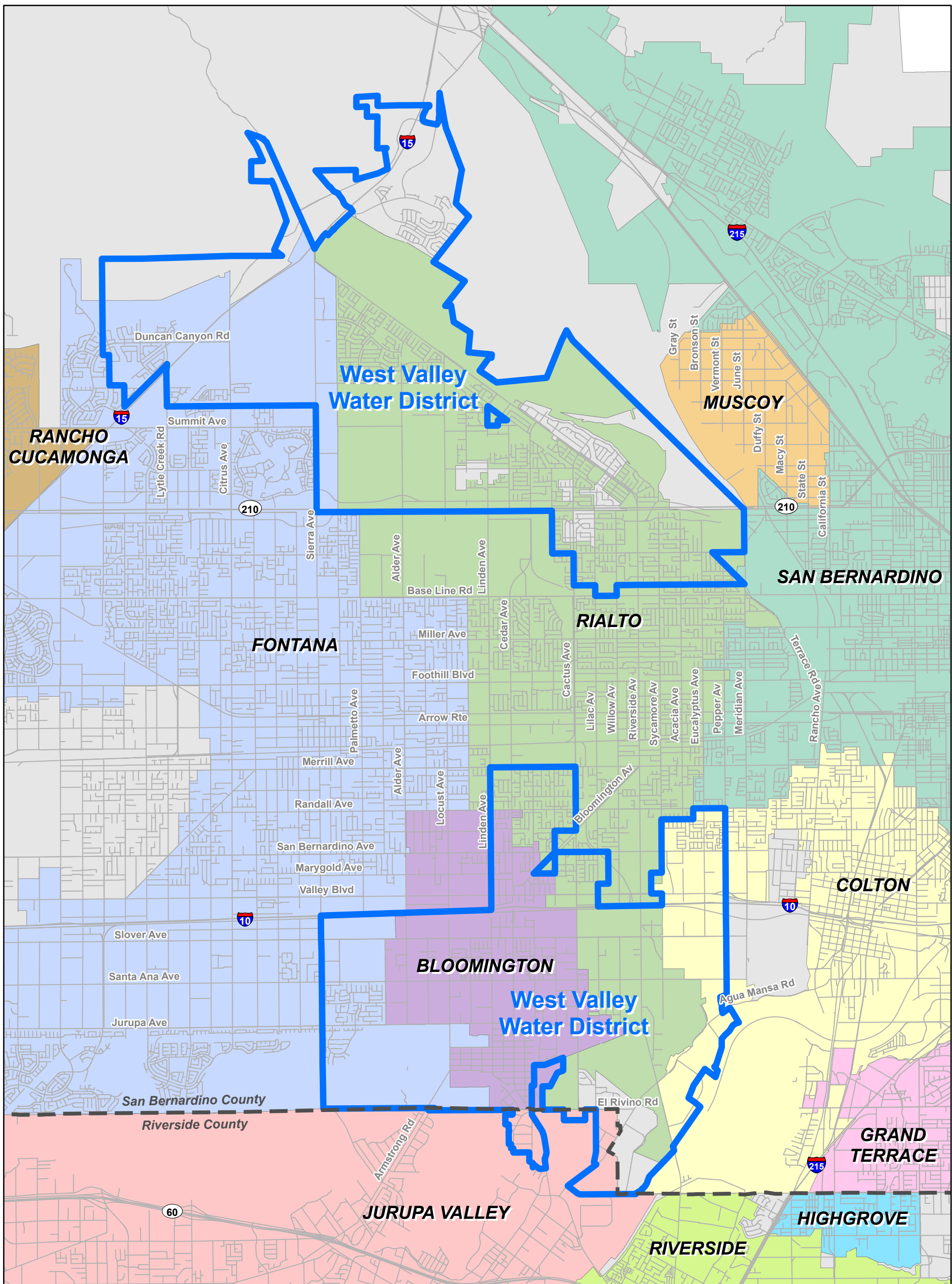
The topography of the service area generally slopes upward from south to north, with service elevations approximately ranging between 900 ft and 2,300 ft. Due to the varying terrain, the service area is divided into eight pressure zones to account for the changes in elevation. Currently, the water demands are met from a combination of groundwater wells and treated surface water. Booster stations and pressure reducing valves (PRVs) convey water from supply sources throughout the individual pressure zones.

### 2.2 WATER SERVICE AREA AND LAND USE

The existing service area is comprised of approximately 11,500 acres of developed lands and 6,300 acres of undeveloped land that is slated for growth. For planning purposes, this master plan evaluated the existing land use, 5-year growth projections, and buildout of the service area.

#### 2.2.1 Existing Land Use

The existing land use within the District's service area is comprised of a relatively even split between residential and non-residential uses. Residential land uses comprise approximately 5,200 acres and non-residential uses totaling approximately 4,600 acres. Other land uses, including utilities, right of way, landscape irrigation, open space, and undeveloped land, make up the remainder of the service area. The existing land use is documented on [Figure 2.3](#) and included on [Table 2.1](#).



**Legend**

- WVWD Service Area
- City Boundaries
- County Boundaries
- Street Centerlines
- Jurupa Valley
- Muscoy
- Rancho Cucamonga
- Bloomington
- Rialto
- Riverside
- Colton
- San Bernardino
- Unincorporated Area
- Fontana
- Grand Terrace
- Highgrove

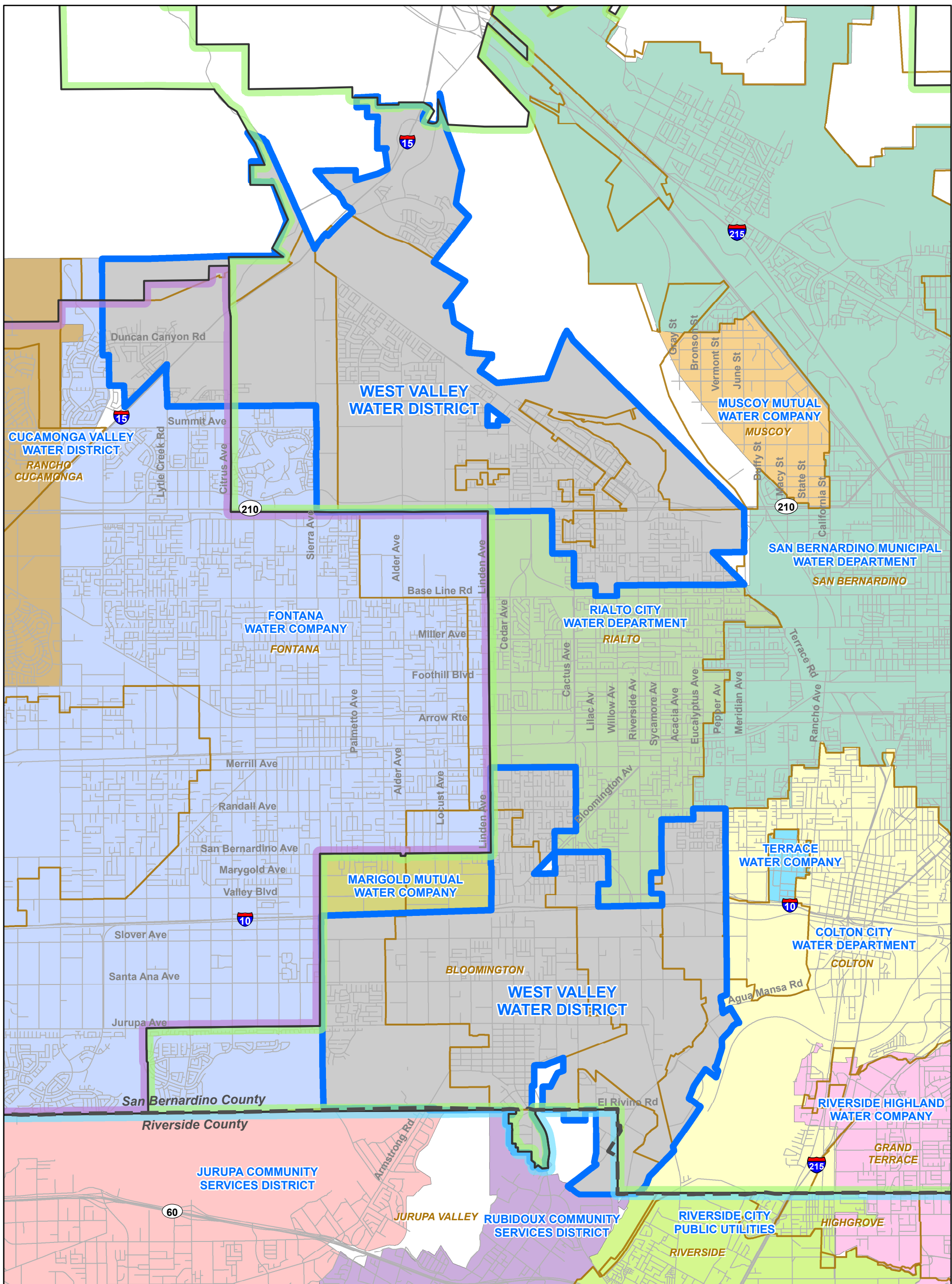
**PRELIMINARY**

**Figure 2.1  
WVWD Service Area  
and Surrounding Cities**

Water Facilities Master Plan  
West Valley Water District







**Legend**

**Regional Water Agencies**

- Inland Empire Utilities Agency
- San Bernardino Valley Municipal Water District
- Western Municipal Water District

**Local Water Agencies**

- West Valley Water District
- Colton City Water Department

- Riverside City Public Utilities
- Cucamonga Valley Water District
- Fontana Water Company
- Jurupa Community Services District
- Marigold Mutual Water Company
- Muscoy Mutual Water Company
- Rialto City Water Department
- Riverside Highland Water Company
- Rubidoux Community Services District
- San Bernardino Municipal Water Department
- Terrace Water Company

- City Boundaries
- County Boundaries
- Street Centerlines

**PRELIMINARY**

Updated: October 3, 2017

0 0.25 0.5 1 Mile

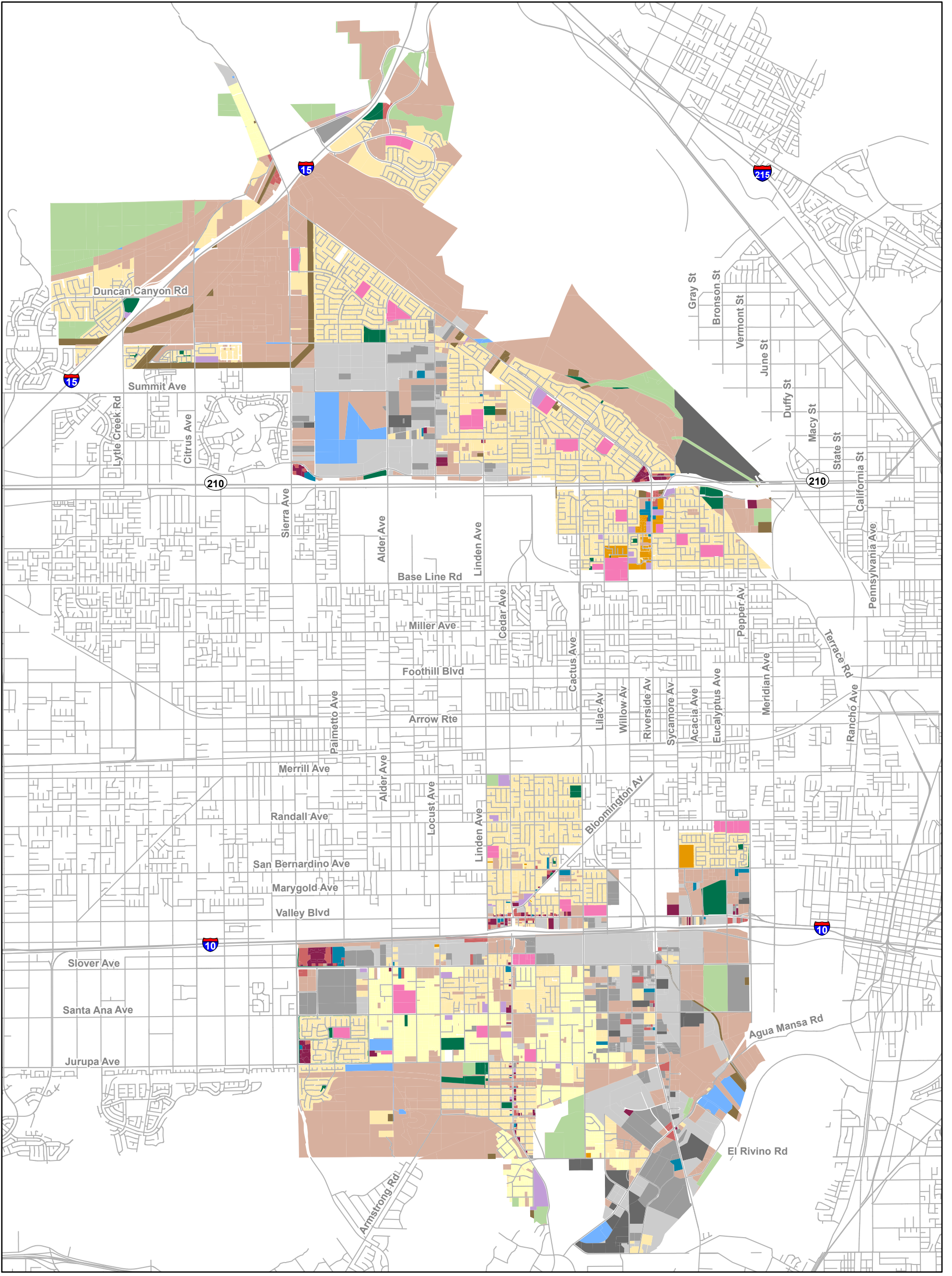


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**Figure 2.2  
WVWD Service Area  
and Surrounding Water  
Agencies**

Water Facilities Master Plan  
West Valley Water District





**Legend**

- Existing Land Use**
- Very Low Density Residential
  - Retail
  - Heavy Industrial
  - Street Centerlines
  - Low Density Residential
  - Educational
  - Utilities
  - Institutional
  - Office
  - Medium Density Residential
  - Public Facility
  - Open Space
  - High Density Residential
  - Industrial
  - Landscape Irrigation
  - Commercial
  - Light Industrial
  - Vacant

**PRELIMINARY**

**Figure 2.3**  
**Existing Land Use**  
 Water Facilities Master Plan  
 West Valley Water District

**Table 2.1 Existing Service Area Land Use**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Land Use Designation	Existing Land Use within District's Service Area (acres)
<b>Residential</b>	
Residential 2	1,080
Residential 6	4,026
Residential 12	4
Residential 21	87
<b>Subtotal- Residential</b>	<b>5,196</b>
<b>Non-Residential</b>	
Commercial	123
Retail	121
Office	72
Educational	373
Institutional	129
Public Facility	324
Light Industrial	1,022
Heavy Industrial	510
Industrial	1,983
<b>Subtotal-Non Residential</b>	<b>4,657</b>
<b>Other</b>	
Utilities	293
ROW	110
Landscape Irrigation	238
Open Space	1,755
Vacant-Undeveloped	5,538
<b>Subtotal- Other</b>	<b>7,934</b>
<b>Total</b>	<b>17,787</b>



### 2.2.2 Five Year Growth Projections

As part of this master plan evaluation, 5-year growth is evaluated for the purpose of identifying improvements necessary to serve development occurring in the near future. District staff have identified areas of development expected to occur within the next five years, which are summarized on [Table 2.2](#) and shown graphically on [Figure 2.4](#), and include the following large development projects:

- **Lytle Creek Ranch.** This development is located along the northeast side of the District service area. The 5-year growth projection for Lytle Creek Ranch includes approximately 1,390 equivalent dwelling units across three pressure zones.
- **Arboretum.** This development is generally located north of Casa Grande Avenue between Sierra Avenue and Citrus Avenue, and south of Segovia Lane. 5-year growth estimates for Arboretum include approximately 1,990 equivalent dwelling units (EDU) in Pressure Zones 6 and 7.

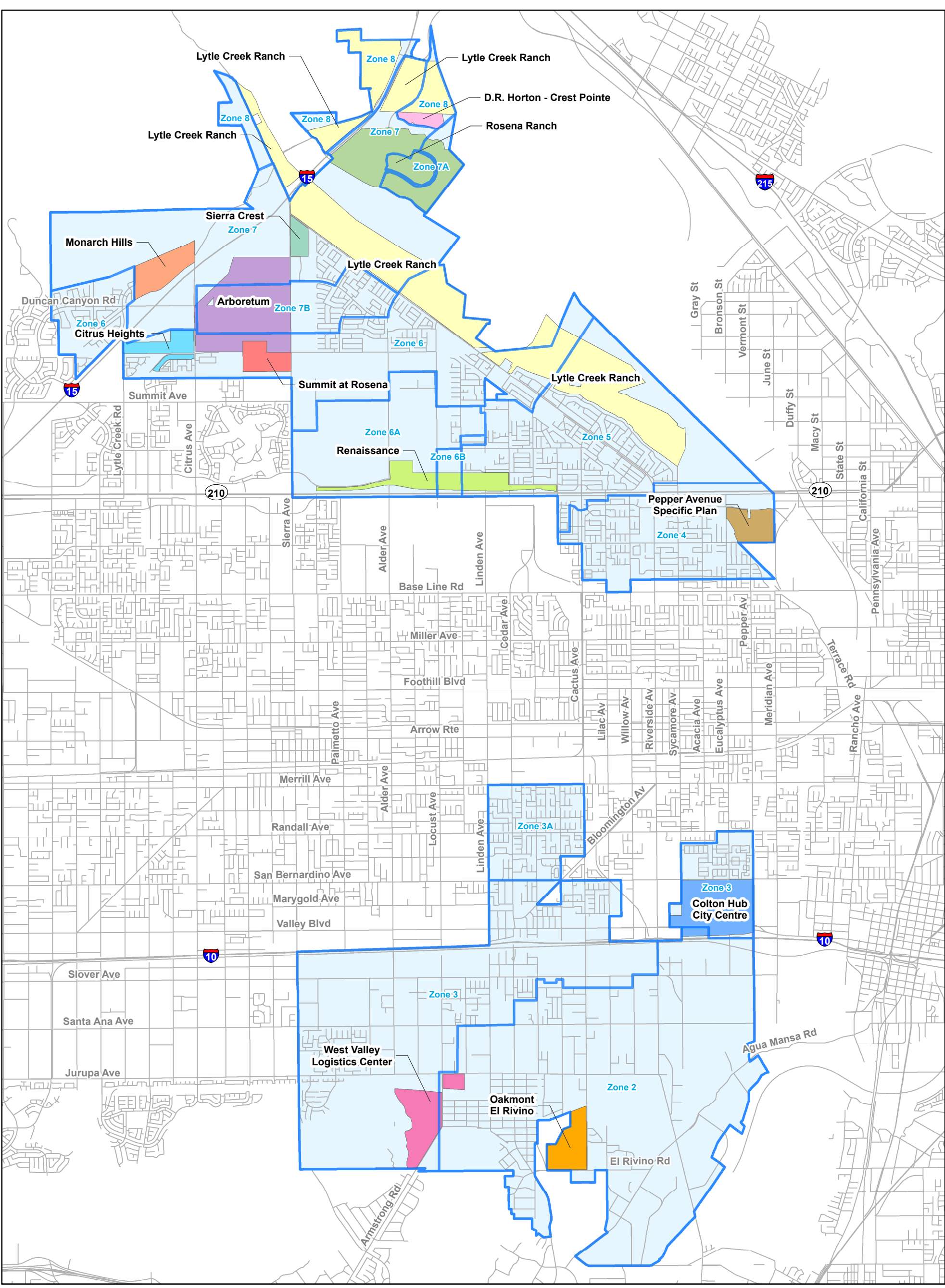
### 2.2.3 Buildout Growth Projections

Buildout land use of the District service area is documented on [Figure 2.5](#) and inventoried on [Table 2.3](#). The existing and future land use acreages are broken down into the following categories:

- **Existing Development:** These acreages represent existing developed lands.
- **Existing Lands - Redeveloped:** These acreages represent existing developed lands expected to redevelop into other land use types within the buildout horizon of the master plan.
- **Existing Development - Unchanged:** These acreages represent the total existing acreages expected to remain within the buildout horizon of the master plan.
- **New Lands - Redevelopment:** These acreages represent lands that have redeveloped from a prior use and into a new respective category.
- **New Development:** These acreages represent gains from the development of existing vacant lands.

This table includes existing lands, lands planned for redevelopment, and undeveloped lands planned for development. The buildout land use projections include approximately 8,800 acres of residential and 5,900 acres of non-residential uses. These acreages were extracted from shapefiles provided by District staff, which consolidated local general plan land uses. For the purposes of this master plan, land use categories with similar densities were consolidated further for ease of reference.





**Legend**

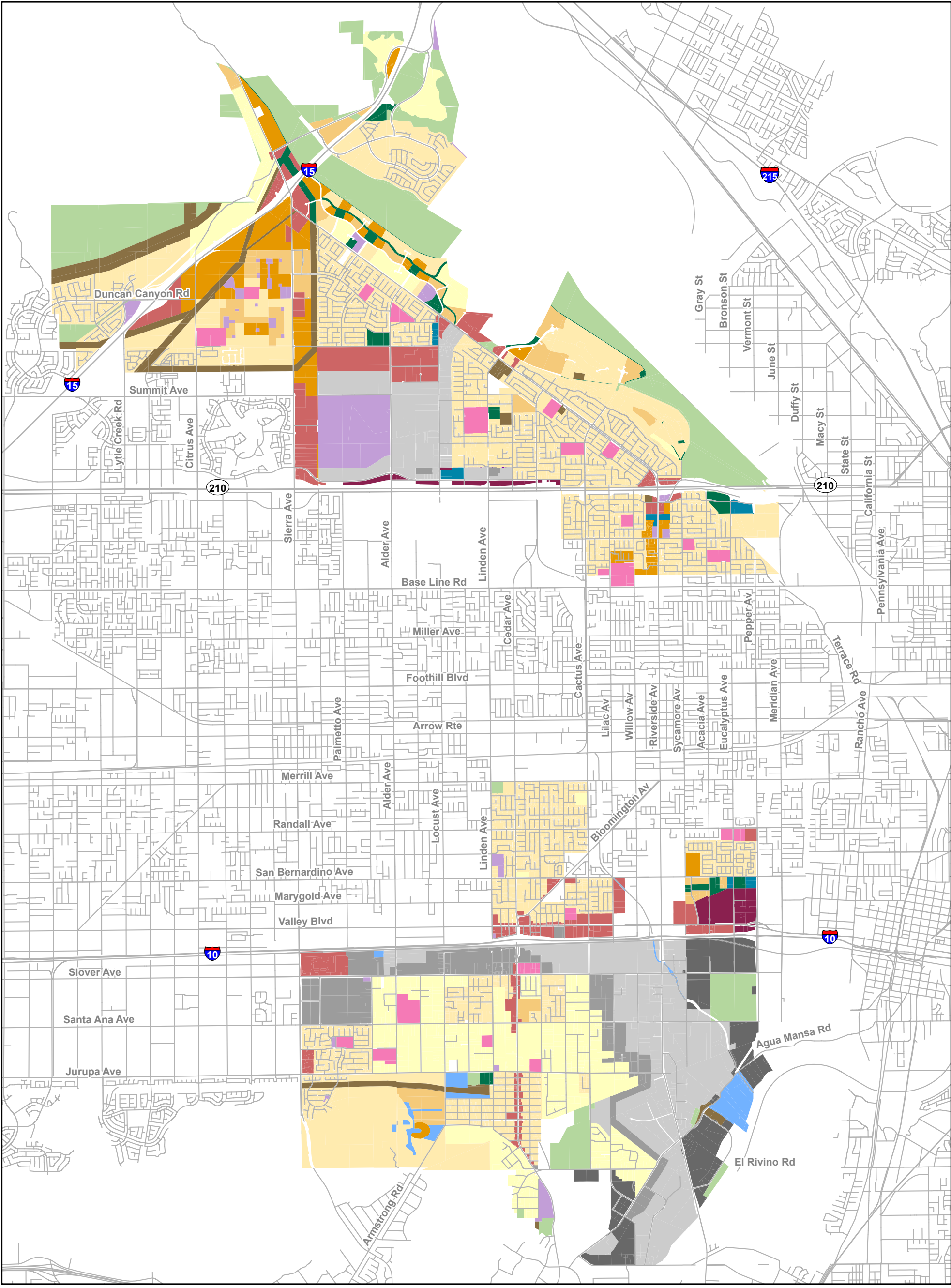
- |                                  |                              |                |
|----------------------------------|------------------------------|----------------|
| <b>Future Major Developments</b> | Oakmont El Rivino            | Pressure Zones |
| Arboretum                        | Pepper Avenue Specific Plan  | Roads          |
| Shady Trails                     | Renaissance                  |                |
| Colton Hub City Centre           | Rosena Ranch                 |                |
| D.R. Horton - Crest Pointe       | Sierra Crest                 |                |
| Lytle Creek Ranch                | Summit at Rosena             |                |
| Monarch Hills                    | West Valley Logistics Center |                |

**PRELIMINARY**

**Figure 2.4**  
**Future Major Developments**  
 Water Facilities Master Plan  
 West Valley Water District



File Path: P:\GIS\GIS\_P\Projects\West Valley WDW\WD\_Fig2.4\_FutureDevelopments\_040218.mxd



**Legend**

**Future Land Use**

- |                              |                 |                      |                    |
|------------------------------|-----------------|----------------------|--------------------|
| Renaissance Specific Plan    | Commercial      | Light Industrial     | Street Centerlines |
| Very Low Density Residential | Retail          | Heavy Industrial     |                    |
| Low Density Residential      | Educational     | Utilities            |                    |
| Medium Density Residential   | Institutional   | Office               |                    |
| High Density Residential     | Public Facility | Open Space           |                    |
|                              | Industrial      | Landscape Irrigation |                    |

**PRELIMINARY**

**Figure 2.5**  
**Future Land Use**  
 Water Facilities Master Plan  
 West Valley Water District



**Table 2.2 5 Year Growth Assumptions**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Pressure Zone ID	Development Designation	Projected EDUs
<b>South System</b>		
<b>Zone 2</b>		
	Miscellaneous Infill	200
	Subtotal	200
<b>Zone 3</b>		
	Wildrose Village- Phase 1	110
	Wildrose Village - Phase 2	64
	Miscellaneous Infill	230
	Subtotal	404
<b>Zone 3A</b>		
	Crestwood Communities	50
	Subtotal	50
<b>North System</b>		
<b>Zone 4</b>		
	Pepper Avenue Specific Plan	50
	Miscellaneous Infill	10
	Subtotal	60
<b>Zone 5</b>		
	Renaissance	50
	Lytle Creek Ranch	900
	Miscellaneous Infill	50
	Subtotal	1,000
<b>Zone 6</b>		
	Renaissance	50
	Arboretum - Meadow	200
	Arboretum - Garden	700
	Shady Trails - Phase 1	100
	Shady Trails - Phase 2	137
	Miscellaneous Infill	50
	Summit at Rosena Development	480

**Table 2.2 5 Year Growth Assumptions**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Pressure Zone ID	Development Designation	Projected EDUs
	Tract 18944	90
	Subtotal	1,807
<b>Zone 7</b>		
	Arboretum - Meadow	390
	Arboretum - Garden	700
	Sierra Crest II	180
	Monarch Hills	472
	Lytle Creek Ranch	100
	Rosena Ranch	400
	D.R. Horton	80
	Tract 18944	90
	Subtotal	2,412
<b>Zone 8</b>		
	Lytle Creek Ranch	390
	Subtotal	390
	Grand Total	<b>6,323</b>



3/13/2018

Source: Development information provided by WVWD staff.



**Table 2.3 Existing and Future Service Area Land Use**Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Land Use Classification	Existing Service Area			Inside Sphere of Influence			Total
	Existing Development	Existing Lands - Redeveloped	Subtotal Existing Lands - Unchanged	New Lands - Redevelopment	New Development		
	(acres)	(acres)	(acres)	(acres)	Inside Existing Service Area (acres)	Outside Existing Service Area (acres)	
1	2	3	4	5	6	7	8
<b>Residential</b>							
Residential 2	1,080	5	1,074	200	721	6	2,002
Residential 6	4,026	412	3,614	231	1,905	5	5,756
Residential 12	4	4	0	147	409	27	583
Residential 21	87	4	83	42	503	57	685
<b>Subtotal- Residential</b>	5,196	425	4,772	621	3,538	95	9,025
<b>Non-Residential</b>							
Commercial	123	65	58	604	323	18	1,004
Retail	121	117	4	96	84	0	184
Office	72	63	9	13	42	0	64
Educational	373	75	299	35	48	0	382
Institutional	129	121	8	283	192	0	482
Public Facility	324	271	53	32	99	0	184
Light Industrial	1,022	698	324	318	104	0	746
Heavy Industrial	510	348	162	178	302	0	643
Industrial	1,983	822	1,161	702	370	0	2,233
<b>Subtotal-Non Residential</b>	4,657	2,579	2,077	2,260	1,565	18	5,921
<b>Other</b>							
Utilities	293	70	223	46	316	0	585
ROW	110	75	35	15	60	0	110
Landscape Irrigation	238	161	77	10	114	25	226
Open Space	0	0	0	327	1,688	195	2,210
Vacant-Undeveloped	5,538	0	0	0	0	0	0
<b>Subtotal- Other</b>	6,179	306	335	397	2,178	219	3,130
<b>Total</b>							
	<b>16,032</b>	<b>3,310</b>	<b>7,184</b>	<b>3,278</b>	<b>7,281</b>	<b>333</b>	<b>18,076</b>



## 2.3 HISTORICAL AND FUTURE POPULATION

The historical population ([Table 2.4](#)) was extracted from the District's 2015 Urban Water Management Plan (UWMP), which utilized population estimates prepared by the Southern California Association of Governments (SCAG). The methodologies for calculating the projected population varied and are briefly summarized as follows:

- 2018-2022: Linearly interpolated between 2017 and 2023 based on the 5-year projected growth.
- 2023: Based on 5-year projected growth assuming 3.5 people per EDU.
- 2024-2039: Linearly interpolated between the 2022 population and the 2040 population projected in the District 2015 UWMP.
- 2040: Extracted from the District 2015 UWMP.
- 2041-2057: Calculated assuming 1.5% annual population growth, consistent with 2015 UWMP growth rate.

Though historical populations were used in understanding the domestic water consumption behaviors and trends, population forecasts are presented for informational purposes only. Estimates of future domestic water demands were not based on population, but rather on net acreage for residential and non-residential land uses. Future population and EDUs were used as a means for estimating the planning horizon of the water system and phasing improvements.

## 2.4 CLIMATE

This section documents the existing climate for the District service area, as well as the potential effects of climate change.

### 2.4.1 Existing Climate

The climate for the West Valley Water District is generally characterized by hot, dry summers and cool winters with intermittent rainfall. The bulk of the rainfall generally occurs in the months from November to April, with approximately 18.81 inches of rainfall typical to the area. The average high temperature in July and August ranges at approximately 95 degrees Fahrenheit, with the average low in December and February at approximately 42 degrees Fahrenheit. It should be noted that the San Gabriel Mountains border the northern extent of the service area, and form the Lytle Creek catchment. Rainfall amounts can rise significantly closer to the mountains due to orographic lifting.

### 2.4.2 Climate Change

The 2015 San Bernardino Valley Regional Urban Water Management Plan (SBVR-UWMP) included the West Valley Water District, and documents the potential effects of climate change on the region. This document sources information from the Upper Santa Ana River Watershed Integrated Regional Water Management Plan and the Climate Change Vulnerability Assessment Checklist.

**Table 2.4 Historical and Projected Population**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Year	Population <sup>1,2</sup>	Annual Growth (%)	Average Annual Demand <sup>3,4</sup>		Per Capita Consumption <sup>5</sup> (gpcd)
			(AF)	(mgd)	
<b>Historical Population<sup>1</sup></b>					
2005	66,442	-	19,796	17.7	266
2006	67,821	2.1%	22,347	20.0	294
2007	69,228	2.1%	23,167	20.7	299
2008	70,665	2.1%	23,638	21.1	299
2009	72,131	2.1%	20,444	18.3	253
2010	73,469	1.9%	19,556	17.5	238
2011	74,807	1.8%	19,479	17.4	232
2012	76,145	1.8%	21,243	19.0	249
2013	77,483	1.8%	20,535	18.3	237
2014	78,821	1.7%	20,229	18.1	229
2015	80,161	1.7%	17,006	15.2	189
2016	82,013	2.3%	16,301	14.6	177
2017	83,902	2.3%	18,778	16.8	200
<b>Projected Population<sup>2</sup></b>					
2018	87,590	4.4%	19,656	17.6	200
2019	91,279	4.2%	20,538	18.3	201
2020	94,967	4.0%	21,424	19.1	201
2021	98,656	3.9%	22,315	19.9	202
2022	102,344	3.7%	23,210	20.7	202
2023	106,033	3.6%	24,109	21.5	203
2024	106,593	0.5%	24,300	21.7	204
2025	107,154	0.5%	24,492	21.9	204
2026	107,715	0.5%	24,684	22.0	205
2027	108,276	0.5%	24,877	22.2	205
2028	108,837	0.5%	25,070	22.4	206
2029	109,398	0.5%	25,265	22.6	206
2030	109,959	0.5%	25,460	22.7	207
2031	110,520	0.5%	25,655	22.9	207
2032	111,081	0.5%	25,851	23.1	208
2033	111,642	0.5%	26,048	23.3	208
2034	112,203	0.5%	26,246	23.4	209
2035	112,763	0.5%	26,444	23.6	209
2036	113,324	0.5%	26,643	23.8	210
2037	113,885	0.5%	26,843	24.0	210
2038	114,446	0.5%	27,043	24.1	211
2039	115,007	0.5%	27,244	24.3	212
2040	115,568	0.5%	27,312	24.5	212
2041	117,302	1.5%	27,857	24.9	212
2042	119,061	1.5%	28,275	25.2	212
2043	120,847	1.5%	28,699	25.6	212
2044	122,660	1.5%	29,129	26.0	212
2045	124,500	1.5%	29,566	26.4	212

**Table 2.4 Historical and Projected Population**  
**Water Facilities Master Plan**  
**West Valley Water District**

PRELIMINARY

Year	Population <sup>1,2</sup>	Annual Growth	Average Annual Demand <sup>3,4</sup>		Per Capita Consumption <sup>5</sup>
		(%)	(AF)	(mgd)	(gpcd)
2046	126,367	1.5%	30,010	26.8	212
2047	128,263	1.5%	30,460	27.2	212
2048	130,186	1.5%	30,917	27.6	212
2049	132,139	1.5%	31,381	28.0	212
2050	134,121	1.5%	31,851	28.4	212
2051	136,133	1.5%	32,329	28.9	212
2052	138,175	1.5%	32,814	29.3	212
2053	140,248	1.5%	33,306	29.7	212
2054	142,352	1.5%	33,806	30.2	212
2055	144,487	1.5%	34,313	30.6	212
2056	146,654	1.5%	34,828	31.1	212
2057	148,854	1.5%	<b>35,350</b>	<b>31.6</b>	<b>212</b>

**AKEL**  
ENGINEERING GROUP, INC.

9/19/2019

Notes :

- Unless noted otherwise, historical population extracted from 2015 UWMP.  
Year 2005 - 2009, 2015: Extracted from 2015 UWMP WWWD SBX7-7 Table 5  
Year 2010 - 2014: Straight line linear interpolation between 2009 and 2015  
Year 2016: Extracted from 2016 Year End Report received June 15, 2017  
Year 2017: Extracted from "Population Estimates 2017" spreadsheet received June 15, 2017
- Population Projection Source:  
Years 2018 - 2022: Linearly interpolated between 2017 and 2023  
Year 2023: Population growth based on 5-Year Growth Assumptions provided by District staff  
Years 2024 - 2039: Linearly interpolated between 2023 and 2040  
Years 2040: 2015 Urban Water Management Plan  
Years 2041 - 2057: Calculated assuming 1.5% annual population growth, consistent with 2015 UWMP
- Historical demand extracted from production statistics received from WWWD staff October 30, 2017. Historical demands exclude water produced for wholesale delivery to other agencies.
- Demand Projection Source.  
Years 2018 - 2022: Demand linearly interpolated between 2017 and 2023  
Year 2023: Additional demand due to 5 year growth, assuming 670 gpd/EDU, and accounting for conservation.  
Year 2024 - 2039: Demand linearly interpolated between 2023 and 2040  
Years 2040: 2015 Urban Water Management Plan  
Years 2041 - 2057: Calculated assuming per capita demand factor of 212 gpcd, consistent with 2015 UWMP demand projection methodology.
- The 2015 UWMP calculated a 2020 Per Capita Water Use Target of 232 gpcd and a 2015 actual per capita water use of 190 gpcd. For demand planning purposes the UWMP used a per capita water use of 209 gpcd (10% increase over 2015). Accounting for water losses and occupancy vacancies the 2019 WFMP uses a per capita water use of 212 gpcd.

The recent climate modeling documented in the SBVR-UWMP indicates that temperatures are expected to rise. The City of Riverside is expected to experience almost double the days exceeding 95 degrees Fahrenheit by 2070 than what were historically recorded. Big Bear, which historically has had no days of 95 degree heat, is expected to have 4 days exceeding this threshold by 2070. The causal effects of the increasing climate temperatures are the reduction in alpine and sub-alpine forestation, and increasing storm intensities with decreasing frequency. The reduction in forest matter with increasing storm intensities are expected to exacerbate flooding concerns. Furthermore, the increase in temperature is expected to elevate mean snow levels, and thus reduce snowpack and yearly groundwater recharge.

The two methods for addressing the changing climate are documented as mitigation and adaptation. Mitigation efforts involve programs and policies intended to reduce carbon emissions, while adaptation efforts involve adjusting to the outcomes of climate change (risk of flooding, temperature increase, etc). It is recommended that as scientific advancements in climate change occur, and the impacts to water infrastructure are documented, that the District plan for efforts in both adaptation and mitigation.

## CHAPTER 3 - SYSTEM PERFORMANCE AND DESIGN CRITERIA

This chapter presents the District's performance and design criteria, which was used in this analysis for identifying current system capacity deficiencies and for sizing proposed distribution mains, storage reservoirs, pump stations and wells.

### 3.1 HISTORICAL WATER USE TRENDS

The historical domestic water consumption per capita was calculated to determine the average water use per capita per day. This was accomplished by dividing the District's historical water production by the historical population for the respective year.

The District's historical per capita consumption factors, for the period 2005-2016, are listed in [Table 3.1](#). The per capita consumption has generally decreased since 2005, being reduced by approximately 20%. This trend is largely attributed to the District's effort of implementing water conservation measures. [Table 3.2](#) lists the last four years of monthly water production for the District from 2013 to 2016.

The ultimate demand forecasts included in this master plan for residential and non-residential land uses is based on net acreages. However, to generalize trends in the District's water use, per capita water use was documented. [Figure 3.1](#) displays the historical population in relation to average daily water production. [Figure 3.2](#) displays a comparison in the per capita water use and average daily water production. The remainder of the District's criteria are summarized in the following sections and on [Table 3.3](#).

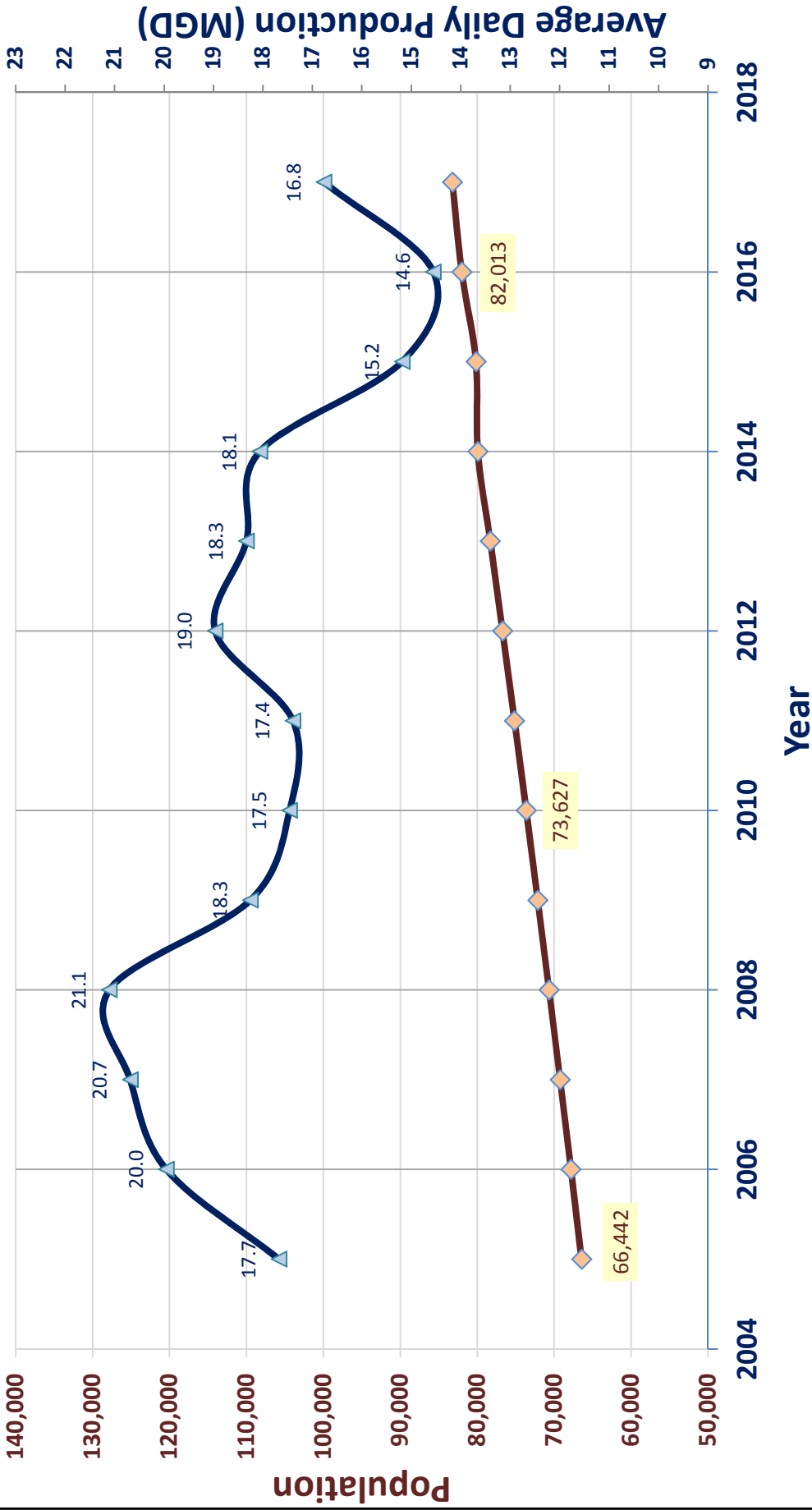
### 3.2 SUPPLY CRITERIA

In determining the adequacy of the domestic water supply facilities, the source must be large enough to meet the varying water demand conditions, as well as provide sufficient water during potential emergencies such as power outages and natural or created disasters.


Ideally, a water distribution system should be operated at a constant water supply rate with consistent supply from the water source. On the day of peak day demand it is desirable to maintain a water supply rate equal to the peak day rate. Water required for peak hour demands or for fire flows would come from storage.

The District currently uses a combination of groundwater wells, State Water Project (SWP) water and treated surface water from Lytle Creek to meet the varying demand conditions of the existing customers. The minimum reliable supply to the surface water treatment facility is estimated to be approximately 4,000 afy, or 3.6 mgd. For supply planning purposes it is assumed that the total required groundwater supply shall be adequate to supply peak day demands less 4,000 afy, which is summarized on the following page.





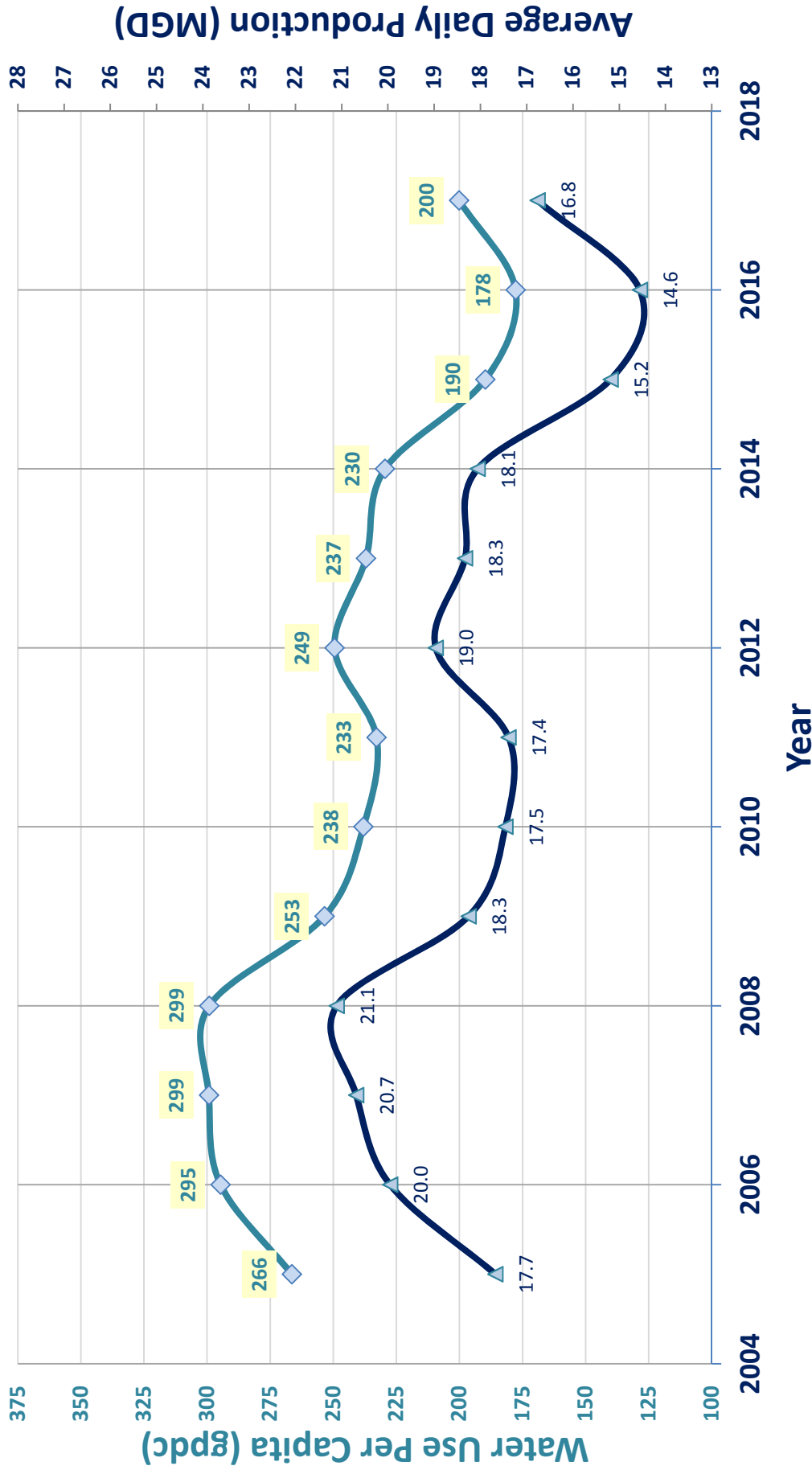
**Figure 3.1**  
**Historical Population vs. Average Daily Production**  
 Water Facilities Master Plan  
 West Valley Water District



PRELIMINARY  
 September 25, 2018

**LEGEND**

- Population (Red diamond)
- Average Daily Production (MGD) (Blue triangle)



**Figure 3.2**  
**Water Use Per Capita vs. Average Daily Production**  
 Water Facilities Master Plan  
 West Valley Water District



**PRELIMINARY**

September 25, 2018

**LEGEND**

- ◆ Per Capita Consumption (gpcd)
- ▲ Average Daily Production (MGD)

**Table 3.1 Historical Annual Water Production and Peak Day Peaking Factors (2005-2017)**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Year	Population <sup>1,2,3,4</sup>	% Increase	Historical Water Production						Average Daily Water Use per Capita (gpcd)				
			Consumption by WWWD (AF)	Delivered to Others (AF)	Total (AF)	Percent Increase	Maximum (mgd)	Month of Occur.		Max-to-Avg Ratio	Daily Production <sup>6</sup> Average (MGD)	Max-to-Avg Ratio	
2005	66,442	-	19,796	1,355	21,151	13,114	-	27.49	July	1.46	17.7	-	266
2006	67,821	2.1%	22,347	1,970	24,317	15,078	15%	30.58	August	1.41	20.0	-	295
2007	69,228	2.1%	23,167	171	23,338	14,471	-4%	28.58	August	1.37	20.7	-	299
2008	70,665	2.1%	23,638	429	24,068	14,923	3%	28.38	August	1.32	21.1	-	299
2009	72,131	2.1%	20,444	1,137	21,581	13,381	-10%	24.97	August	1.30	18.3	-	253
2010	73,469	1.9%	19,556	1,210	20,766	12,876	-4%	25.19	August	1.36	17.5	-	238
2011	74,807	1.8%	19,479	1,146	20,624	12,788	-1%	27.25	July	1.48	17.4	-	233
2012	76,145	1.8%	21,243	1,294	22,537	13,974	9%	26.08	August	1.30	19.0	-	249
2013	77,483	1.8%	20,535	1,065	21,600	13,393	-4%	23.13	July	1.20	18.3	-	237
2014	78,821	1.7%	20,229	931	21,160	13,120	-2%	23.63	July	1.25	18.1	-	230
2015	80,161	1.7%	17,006	1,191	18,197	11,283	-14%	18.62	August	1.15	15.2	-	190
2016	82,013	2.3%	16,301	2,070	18,371	11,391	1%	20.08	August	1.22	14.6	-	178
2017	83,902	2.3%	18,778	1,243	20,021	12,414	9%	22.47	July	1.26	16.8	-	200
<b>Historical Maximum Peaking Factors</b>													
7-Year Maximum (2011-2017)					22,537	13,974	9%	27		1.48	19.0	-	249
5-Year Maximum (2013-2017)					21,600	13,393	9%	24		1.26	18.3	-	237
3-Year Maximum (2015-2017)					20,021	12,414	9%	22		1.26	16.8	-	200
2017 Maximum					20,021	12,414	9%	22		1.26	16.8	-	200
<b>Recommended Peaking Factors</b>													
<b>2012 Water System Master Plan Criteria</b>											1.70		
<b>2019 Water System Master Plan</b>											1.70		
											1.40		

9/12/2019

Notes:

- Historical Population from 2005 to 2014 extracted from the District's Public Water System Statistics provided by District staff September 12, 2019
- 2015 population extracted from 2015 Urban Water Management Plan
- 2016 population extracted from "2016 Year End Report", provided by District Staff on June 17, 2017
- 2017 population extracted from "2017 Year End Report", provided by District Staff on September 25, 2018
- Annual production statistics received September 25, 2018 (including distinction between actual WWWD consumption and water delivered to others (WWWD customers versus Water Wholesale to other agencies).
- Source: Public Water System Statistics received from District staff June 15, 2017; "Year end report" for year 2016, received June 15, 2017. Monthly and Daily Production Statistics not including water wholesale to other agencies.

**Table 3.2 Historical Monthly Water Production (2015-2017)**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Month	2015			2016			2017		
	Monthly <sup>1</sup> Production (mgd)	Percent of Annual (%)	Peaking Factor Month to Avg Factor	Monthly <sup>2</sup> Production (mgd)	Percent of Annual (%)	Peaking Factor Month to Avg Factor	Monthly <sup>3</sup> Production (mgd)	Percent of Annual (%)	Peaking Factor Month to Avg Factor
January	12.6	7%	0.83	9.0	5%	0.62	8.22	4%	0.49
February	12.4	7%	0.82	11.0	6%	0.75	8.34	4%	0.50
March	14.5	8%	0.96	11.8	7%	0.81	12.63	6%	0.76
April	17.2	9%	1.14	12.1	7%	0.83	16.39	8%	0.98
May	15.2	8%	1.00	14.2	8%	0.98	17.27	9%	1.03
June	18.5	10%	1.22	17.8	10%	1.22	20.41	10%	1.22
July	17.0	9%	1.12	20.0	11%	1.38	22.47	11%	<b>1.34</b>
August	18.6	10%	<b>1.23</b>	20.1	12%	<b>1.38</b>	20.72	10%	1.24
September	16.5	9%	1.09	17.5	10%	1.20	19.16	10%	1.15
October	14.1	8%	0.93	15.6	9%	1.07	19.56	10%	1.17
November	13.3	7%	0.88	14.0	8%	0.96	18.08	9%	1.08
December	12.1	7%	0.80	11.4	7%	0.78	17.32	9%	1.04
<b>Total</b>	<b>182.1</b>			<b>174.4</b>			<b>200.6</b>		
<b>Average Value</b>	<b>15.2</b>			<b>14.5</b>			<b>16.7</b>		
<b>Maximum Value</b>	<b>18.6</b>		<b>1.23</b>	<b>20.1</b>		<b>1.38</b>	<b>22.5</b>		<b>1.34</b>



Notes:

1. PWSS Statistics received from District Staff, not including water deliveries to customers outside the District Service Area (wholesale to other agencies)
2. Monthly Production extracted from " 2016 Year End Report", received from District Staff 06/15/2017. Does not include wholesale to other agencies.
3. Monthly Production extracted from " 2017 Year End Report", received from District Staff 09/25/2018. Does not include wholesale to other agencies.

9/25/2018





- Total Required Groundwater Supply = Peak Day Demands – 4,000 afy (3.6 mgd)

### 3.3 STORAGE CRITERIA

The intent of domestic water storage is to provide supply for operational equalization, fire protection, and other emergencies, such as power outages or supply outages. Operational or equalization storage provides the difference in quantity between the customer's peak hour demands and the system's available reliable supply. The District storage criteria varies depending on what pressure zone is being served.

#### 3.3.1 Typical Storage Criteria

The District's storage criteria consists of three main elements: operational, fire flow, and pumping.

##### Operational Storage

Operational or equalization storage capacity is necessary to reduce the variations imposed on the supply system by daily demand fluctuations. Peak hour demands may require up to 2 times the amount of maximum day supply capacity. With storage in place, this increase in demand can be met by the operational storage rather than by increasing production from the supply sources. The District criteria for all pressure zones is to maintain an operational storage amount equal to 100 percent of peak day demand.

- Operational Storage = 100% x PDD

##### Fire Storage

Fire storage is also needed to mitigate potential emergencies that may occur in the pressure zone, and in compliance with relevant fire codes. The recommended fire storage capacity varies by pressure zone and land use type, and is usually higher for commercial and industrial areas. Fire flow provisions for each pressure zone were calculated based on the governing (highest) land use type within a reservoir service area as follows:

- Low Density Residential: 1,500 gpm for 2 hours = 0.18 MG
- High Density Residential: 3,000 gpm for 3 hours = 0.54 MG
- Schools/Commercial: 3,000 gpm for 3 hours = 0.54 MG
- Office/Light Industrial: 3,000 gpm for 3 hours = 0.54 MG
- Heavy Industrial: 4,000 gpm for 4 hours = 0.96 MG

##### Pumping Storage

The majority of the District's existing and planned groundwater wells with pump stations convey through the North System. In order to ensure a sufficient volume of water is available for pumping

to meet the demands of the North System the District requires an additional amount of water to be stored in the water storage reservoirs. Therefore, Pressure Zones 4, 5, 6 and 7 carry additional pumping storage volumes for the respective higher zones, less the 4.0 mgd capacity of the WFF.

- Pumping Storage = 100% x ADD of Supply Dependent Pressure Zones - 4.0 mgd

### Total Storage Requirement

The total storage (Qs) is the summation of operational (equalization), fire, and pumping storage requirements as follows:

For Pressure Zones 2, 3, 3A, 8:

- $Q_s = \text{Peak Day Demand} + \text{fire flow (varies)}$

For Pressure Zones 4, 5, 6, 7:

- $Q_s = \text{Peak Day Demand} + \text{fire flow (varies)} + \text{Pumping (varies)}$

## 3.4 PRESSURE CRITERIA

Acceptable service pressures within distribution systems vary depending on District criteria and pressure zone topography. It is essential that the water pressure in a consumer's residence or place of business be maintained within an acceptable range. Low pressures below 30 psi can cause undesirable flow reductions when multiple faucets or water using appliances are used at once.

Excessively high pressures can cause faucets to leak and valve seats to wear out prematurely. Additionally, high service pressures can cause unnecessarily high flow rates, which can result in wasted water and high utility bills. The criteria for pressures in the domestic water system include the following:

- Maximum pressure, usually experienced during low demands and winter months
- Minimum pressure, usually experienced during peak hour demands and summer months
- Minimum pressure during simultaneous peak day demand and fire flow

The American Water Works Association Manual on Computer Modeling and Water Distribution System (AWWA M-32) indicates that maximum pressures are usually in the range of 90-110 pounds per square inch (psi). In some communities, the maximum pressure may be limited to 80 psi to mitigate the impact on internal plumbing. In this case, the distribution system is usually sized for the higher pressures, and individual pressure-reducing valves are installed on service lines where the pressure may be exceeded.

The minimum acceptable pressure is usually in the range of 40-50 psi, which generally provides for sufficient pressures for second story fixtures. When backflow preventers are required, they may reduce the pressures by approximately 5-15 psi. The recommended minimum pressure during fire flows is 20 psi, as established by the National Fire Protection Association (NFPA).

The District's pressure criteria are summarized as follows:

- Maximum pressure (pipelines): 130 psi
- Maximum pressure (service connections): 80 psi
- Minimum pressure (PHD): 40 psi
- Minimum pressure (PDD + Fire Flow): 20 psi

### 3.5 UNIT FACTORS

Domestic water demand unit factors are coefficients commonly used in planning level analysis to estimate future average daily demands for areas with predetermined land uses. The unit factors are multiplied by net acreages to yield the average daily demand projections.

The total domestic water demand was extracted from consumption data maintained by the District. The demand was adjusted to balance with current production records, and to account for transmission main losses and vacancies in existing land uses. For planning purposes, the production used to develop the water demand unit factors was based on 2014 production data minus ten percent to account for current water conservation trends. The demand unit factor was then calculated using the calculated water production and total number of residential and non-residential land use acreages.

This analysis generally indicates that existing residential land uses have higher consumptive use factors than that of non-residential land uses. The existing unit factor analysis is shown on [Table 3.4](#). It should be noted that extensive water conservation efforts have reduced water demands beyond the required "20x2020" target water use. The water production target of 2014 minus 10 percent is below the "20x2020" target, but is considered reasonable and conservative based on 2015 and 2016 production records. The water demand unit factors are summarized on [Table 3.5](#). It should be noted that the existing industrial factors are low compared to industry standards, and were adjusted to reflect more conservative planning assumptions.

It should be noted that the water demand unit factors utilized in this WFMP are generally lower for all land use types as compared to the 2012 WMP. A comparison of the water demand unit factors is included in [Appendix A](#). The water demand unit factors prepared as part of this master plan reflect changes in water use due to recent drought conditions, as well as a revised land use analysis.

**Table 3.4 Water Demand Unit Factor Analysis**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Land Use Classification	Existing Development within Service Area (net acres)	Existing Average Daily Water Demand Unit factors									
		Consumption <sup>1</sup>		Production <sup>2</sup>		Production at 100% Occupancy					
		Unadjusted Water Unit Factors (gpd/net acres)	Annual Consumption (gpd)	Unadjusted Water Unit Factors (gpd/net acres)	Production (w/o Vacancy rate) (gpd)	Vacancy Rate <sup>3,4</sup> (%)	Projected Production at 100% Occupancy (gpd)	Recommended Unit Factor (gpd)	Balance Using Recommended Unit Factor (gpd)		
<b>Residential</b>											
Residential 2	1,080	734	792,487	550	926	1,000,047	5.9%	984	1,062,750	990	1,068,792
Residential 6	4,026	1,974	7,945,858	5,518	2,491	10,026,958	5.9%	2,647	10,655,641	2,650	10,667,777
Residential 12	4	3,414	12,569	9	4,308	15,861	5.9%	4,578	16,856	4,580	16,864
Residential 21	87	4,196	367,009	255	5,295	463,133	5.9%	5,627	492,171	5,630	492,419
<i>Subtotal Residential</i>	5,196		9,117,923	6,332		11,505,999			12,227,417		12,245,852
<b>Non-Residential</b>											
Commercial	123	1,249	154,053	107	1,576	194,401	12.1%	1,794	221,254	1,800	221,977
Retail	121	1,311	158,092	110	1,655	199,498	12.1%	1,884	227,055	1,890	227,828
Office	72	981	70,462	49	1,238	88,916	12.1%	1,409	101,198	1,410	101,302
Educational	373	1,415	528,135	367	1,786	666,459	0.0%	1,786	666,459	1,790	667,905
Institutional	129	1,112	142,911	99	1,403	180,341	0.0%	1,403	180,341	1,410	181,224
Public Facility	324	191	61,965	43	241	78,194	0.0%	241	78,194	250	81,009
Light Industrial	1,022	380	388,224	270	479	489,904	4.6%	502	513,508	500	511,143
Industrial	1,983	332	657,527	457	418	829,740	4.6%	439	869,718	1,000	1,983,076
Heavy Industrial	510	1,149	586,004	407	1,451	739,484	4.6%	1,520	775,113	1,530	780,002
<i>Subtotal - Non-Residential</i>	4,657		2,747,373	1,908		3,466,938			3,632,842		4,755,466
<b>Other</b>											
Landscape Irrigation <sup>6</sup>	450	2,125	956,577	664	2,681	1,207,114	0.0%	2,681	1,207,114	2,690	1,210,981
Marygold Mutual Water Company <sup>7</sup>			652,512			652,212			652,212		652,212
ROW	110	0	0	0	0	0	0.0%	0	0	0	0
Utilities	293	2	445	0	2	561	0.0%	2	561	10	2,931
Open Space	1,755	0	0	0	0	0	0.0%	0	0	0	0
<i>Subtotal - Other</i>	2,820		1,609,534	1,118		1,859,888			1,859,888		1,866,124
	12,673		13,474,831	9,358		16,832,825			17,720,146		18,867,442



Note:

- Consumption extracted from the 2016 water meter shapefile database, provided by District Staff July 5, 2017.
- Meters consumption was normalized to 2014 production records minus 10 percent (90% of 2014 Production Records).
- Residential vacancy rate extracted from California Department of Finance Sheet E-5 published 2016.
- Non-residential vacancy rates extracted from Inland Empire 2013 market report prepared by Voit Real Estate Services, downloaded September 11, 2017. Vacancy rates shown are average of rates for the cities of Fontana, Rialto, and Colton.
- Residential Landuse categories extracted from the 2010 General Plan Landuse, published by the City of Rialto.
- Landscape irrigation acres include estimated acres for irrigated parkways, which were assumed at 1 acre per meter.
- Marygold Mutual Water Company demand extracted from wholesale water sale information included in water billing records received from District staff July 5, 2017. Meter located south of the intersection of Randall Avenue and Cedar Avenue.

10/5/2017

**Table 3.5 Recommended Water Unit Factors**

Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Land Use Designation	Recommended Water Factor	
	(gpd/ acre)	(gpm/acre)
<b>Residential</b>		
Residential 2	990	0.69
Residential 6	2,650	1.84
Residential 12	4,580	3.18
Residential 21	5,630	3.91
<b>Non-Residential</b>		
Commercial	1,800	1.25
Retail	1,890	1.31
Office	1,410	0.98
Educational	1,790	1.24
Institutional	1,410	0.98
Public Facility	230	0.16
Light Industrial	500	0.35
Industrial	1,000	0.69
Heavy Industrial	1,530	1.06
<b>Other</b>		
Landscape Irrigation	2,690	1.87
ROW	0	0
Utilities	10	0.01



1/11/2019



## 3.6 SEASONAL DEMANDS AND PEAKING FACTORS

Domestic water demands within municipal water systems vary with the time of day and month of the year. It is necessary to quantify this variability in demand so that the water distribution system can be evaluated and designed to provide reliable water service under these variable demand conditions.

Water use conditions that are of particular importance to water distribution systems include the average day demand (ADD), the peak month demand (PMD), the peak day demand (PDD), the peak hour demand (PHD), and the winter demand.

The average day demand represents the annual water demand, divided by 365 days, since it is expressed in daily units. The winter demand typically represents the low month water demands and is used for simulating water quality analysis.

### 3.6.1 Peak Month Demand

The peak month demand (PMD) is the highest demand that occurs within a calendar month during a year. The District's PMD usually occurs in the summer months, in either July or August. The PMD is used primarily in the evaluation of supply capabilities.

Historical monthly water production records, obtained for the period between 2005 and 2015 (Table 3.1), indicate the maximum month to average month ratio ranging between 1.25 and 1.52. Over the reviewed period, this ratio showed increasing or decreasing trends. Therefore, a PMD factor of 1.40 was deemed representative of trends in the District service area. The following equation is recommended for estimating the maximum month demand, given the average day demand:

$$\text{Peak Month Demand} = 1.40 \times \text{Average Day Demand}$$

### 3.6.2 Peak Day Demand

The peak day demand is the highest demand that occurs within a 24 hour day during a year. The District's PDD, which usually occurs during the summer months, is typically used for the evaluation and design of storage facilities, distribution mains, pump stations, and pressure reducing valves. The PDD, when combined with fire flows, is one of the highest demands that these facilities should be able to service while maintaining acceptable pressures within the system.

The peak day demands were obtained from the District's water production records. Production records indicate the date of occurrence and magnitude of the peak day demand for each calendar year, as listed in Table 3.1. Monthly data was provided by the District for review of water demand trends and peaking factor evaluation. For the purposes of this Master Plan, the peak day demand factor is assumed at 1.7 times the average day demand and consistent with the previous master

plan. The following equation is then used to estimate the peak day demand, given the average day demand:

$$\text{Peak Day Demand} = 1.70 \times \text{Average Day Demand}$$

**3.6.3 Peak Hour Demand**

The peak hour demand is another high demand condition that is used in the evaluation and design of water distribution systems. The peak hour demand is the highest demand that occurs within a one-hour period during a year. The peak hour demand is considered to be the largest single measure of the maximum demand placed on the distribution system. The PHD is often compared to the MDD plus fire flow to determine the largest demand imposed on the system for the purpose of evaluating distribution mains.

A peak hour to peak day ratio of 1.7 was applied to the peak day demand to yield the peak hour demand ratio of 2.9, consistent with the District design standards. The peak hour demand can then be calculated using the average day demand and the following equation:

$$\text{Peak Hour Demand} = 1.70 \times \text{Peak Day Demand}$$

**3.7 FIRE FLOWS**

Fire flows are typically based on land use, with the potential for increased fire flow based on the building type. The following are the criteria for fire flows:

- **Low Density Residential.** Fire flows for low density residential land use types were calculated at 1,500 gpm for two hours.
- **High Density Residential.** Fire flows for high density residential land use types were calculated at 3,000 gpm for three hours.
- **Schools/ Commercial.** Fire flows for schools and commercial land use types were calculated at 3,000 gpm for three hours.
- **Office/ Light Industrial.** Fire flows for office and light industrial land use types was calculated at 3,000 gpm for three hours.
- **Heavy Industrial.** Fire flows for heavy industrial land use types were calculated at 4,000 gpm for four hours.

**3.8 TRANSMISSION AND DISTRIBUTION MAIN CRITERIA**

Transmission and distribution mains are usually designed to convey the maximum expected flow condition. In municipal water systems, this condition is usually the greater of either the peak hour demand or the peak day demand plus fire flow. The hydrodynamics of pipe flow create two additional parameters that are taken into consideration when evaluating or sizing water mains: head loss and velocity.

Head loss is a loss of energy within pipes that is caused by the frictional effects of the inside surface of the pipe and friction within the moving fluid itself. Head loss creates a loss in pressure which is undesirable in water distribution systems. Head loss, by itself, is not a critical factor as long as the pressure criterion has not been violated. However, high head loss may be an indicator that the pipe is nearing the limit of its carrying capacity and may not have sufficient capacity to perform under stringent conditions. The District criterion for maximum pipeline head loss is summarized as follows:

- Peak Day Demand: 5 feet per 1,000 feet of pipe

Since high flow velocities can cause damage to pipes and lead to high head loss, it is desirable to keep the velocity below a predetermined limit. The District criteria for maximum pipeline velocity are summarized as follows:

- Peak Day Demand: 5 feet per second
- Peak Day Demand + Fire Flow: 10 feet per second

These velocity criteria also ensure that the head loss is kept below an acceptable limit, as the head loss in a pipe is a function of the flow velocity. Flow velocities in transmission mains 14 inches and larger are governed by the head loss criteria.

A summary of the criteria pertaining to transmission and distribution mains is included in [Table 3.3](#). The pipe roughness coefficient used for calculating head loss was based on the District criterion of 120.

It should be noted that the headloss criteria in transmission mains may be relaxed, where feasible, to account for transmission main redundancy and reliability. Relaxing of the criteria requires the review and approval of the District.

### 3.9 TIME OF USE

Southern California Edison (SCE) has defined peak use times of the year where a tiered system of energy rates are implemented to encourage decreased energy consumption. Time of use is implemented from June 1 through September 30, which coincides with the maximum day and peak hour demands in the water system. There are three stages of energy rates during summer time of use:

- **Off Peak:** This category is typically associated with the lowest energy costs and occurs from 9:00 PM to 4:00 PM.
- **Partial Peak:** This category has medium energy costs and is intended to minimize energy use when possible. It occurs from 4:00 PM to 9:00 PM on weekends and holidays.
- **On Peak:** This is the highest cost category, and is intended to encourage users to avoid energy consumption whenever possible. It occurs from 4:00 PM to 9:00 PM.

District staff have been implementing time of use pumping, when possible, throughout their system to reduce operational costs. It should be noted that time of use pumping may impact the sizing of pipelines within pressure zones during nighttime replenishment pumping. This high pumping period is accounted for in this master plan analysis, and modeling scenarios reflect the time of use periods.

## CHAPTER 4 - EXISTING DOMESTIC WATER FACILITIES

This chapter provides a description of the District's existing domestic water system facilities including the distribution mains, storage reservoir, booster pump stations and the existing wells.

### 4.1 EXISTING WATER SYSTEM OVERVIEW

The District operates a domestic water distribution system that consists of 21 groundwater wells, 25 separate storage reservoirs across eight pressure zones shown in [Figure 4.1](#), for a total storage over 72 million gallons (MG), and over 375 miles of transmission and distribution pipelines.

The District's existing domestic water distribution system is shown in [Figure 4.2](#), which displays the existing system by pipe size. This figure provides a general color coding for the distribution mains, as well as labeling the existing wells, booster stations, pressure reducing valves, and the storage reservoirs. Additionally, [Figure 4.3](#) summarizes the existing system with pipelines colored based on pressure zone. A hydraulic profile based on the existing operations of the District's water system is provided on [Figure 4.4](#). The District is generally divided into two sections, commonly referred to as the North System and South System, which are briefly summarized in the following sections.

#### 4.1.1 North System

The District's North System, comprised of Pressure Zones 4, 5, 6, 7 and 8, provides domestic water service to the District's customers north of Baseline Road. Supply for this system is provided by multiple groundwater wells, the Roemer WFF in Pressure Zone 5, and water boosted from the Baseline Feeder to Pressure Zone 4 at the Lord Ranch Facility.

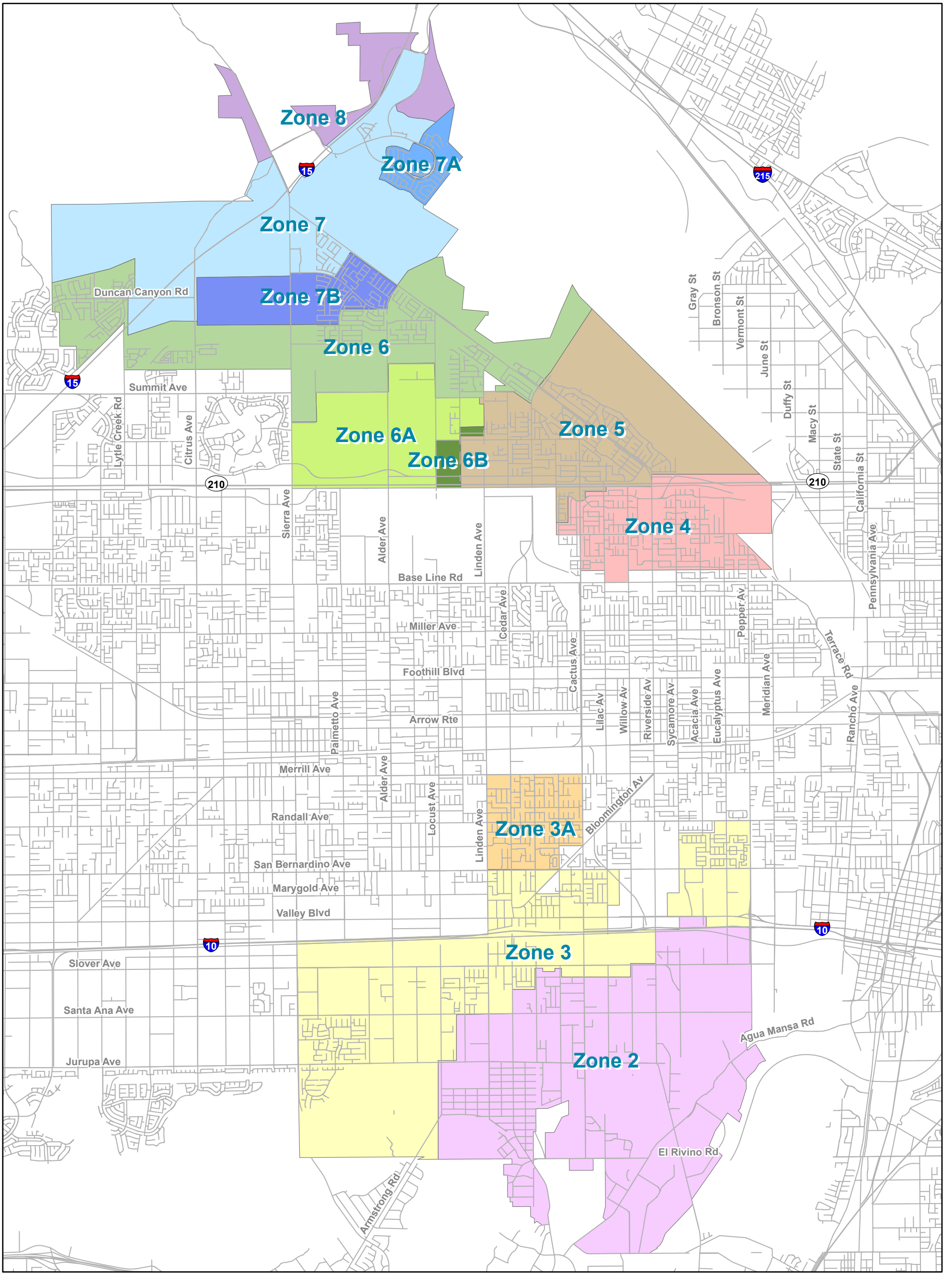
#### 4.1.2 South System

The District's South System, comprised of Pressure Zones 3A, 3, and 2, provides domestic water service to the District's customers generally located south of Merrill Avenue. Supply for this system is provided by multiple groundwater wells and the FBR treatment facility in Pressure Zone 3A.

### 4.2 SOURCE OF SUPPLY

In order to meet existing domestic water demands, the District utilizes several sources of supply, including groundwater and treated surface water. The following section provides a brief summary of these sources, with a more detailed discussion provided in the Water Demands and Supply Characteristics chapter.





**Legend**

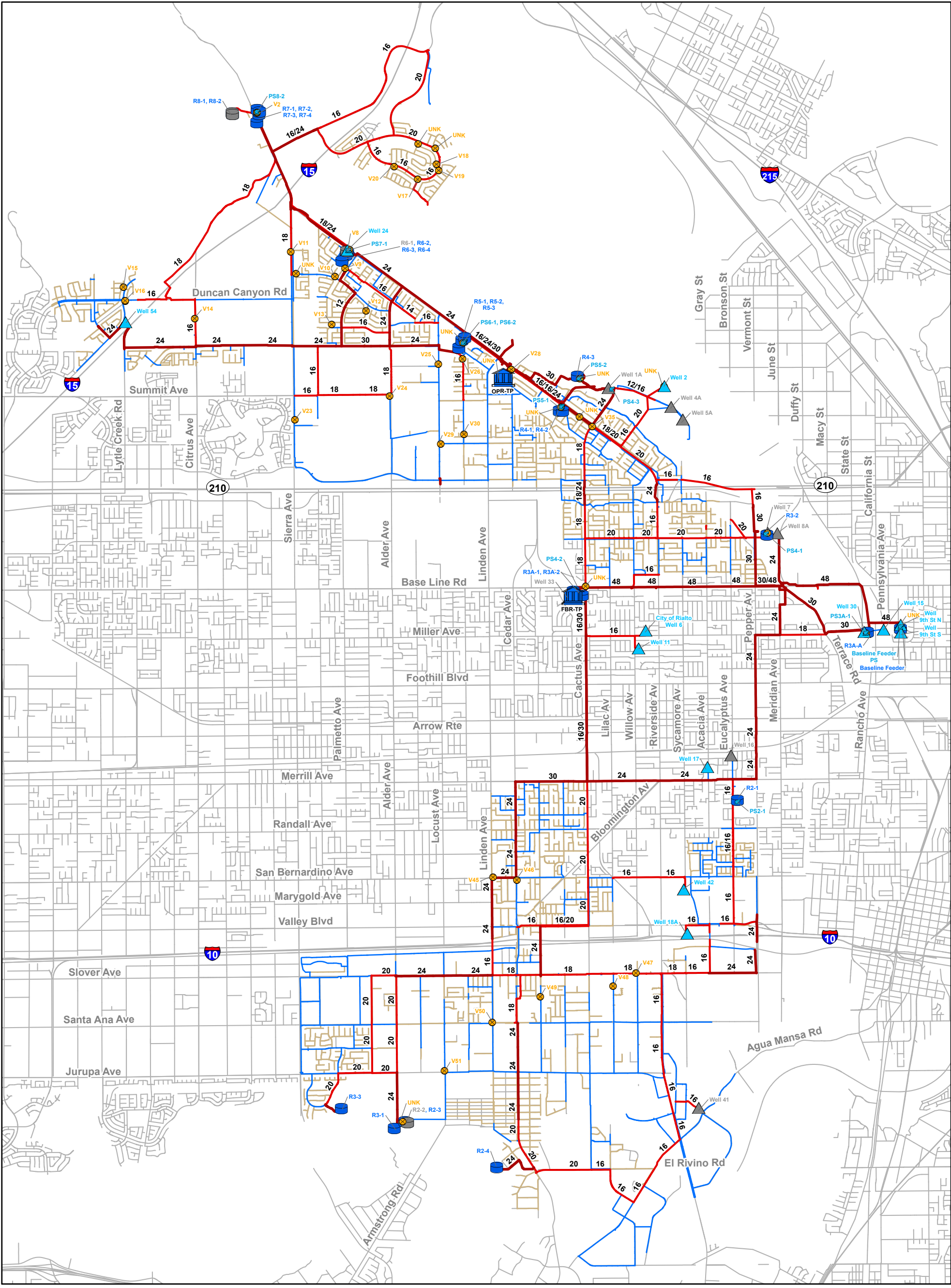
- Pressure Zones**
- Zone 6A
  - Zone 2
  - Zone 3
  - Zone 3A
  - Zone 4
  - Zone 5
  - Zone 6
  - Zone 6A
  - Zone 6B
  - Zone 7
  - Zone 7A
  - Zone 7B
  - Zone 8
- Street Centerlines

**PRELIMINARY**

**Figure 4.1  
Existing Pressure Zones**

Water Facilities Master Plan  
West Valley Water District





- Legend**
- Existing System**
  - WTP
  - Tanks
  - Inactive Tanks
  - Active Wells
  - Inactive Wells
  - Pumps
  - Valves
  - Pipes by Diameter**
  - 8" and Smaller
  - 10" - 12"
  - 16" - 20"
  - 24" - 48"
  - Street Centerlines

**PRELIMINARY**

**Figure 4.2**  
**Existing Water Distribution System**  
 Water Facilities Master Plan  
 West Valley Water District

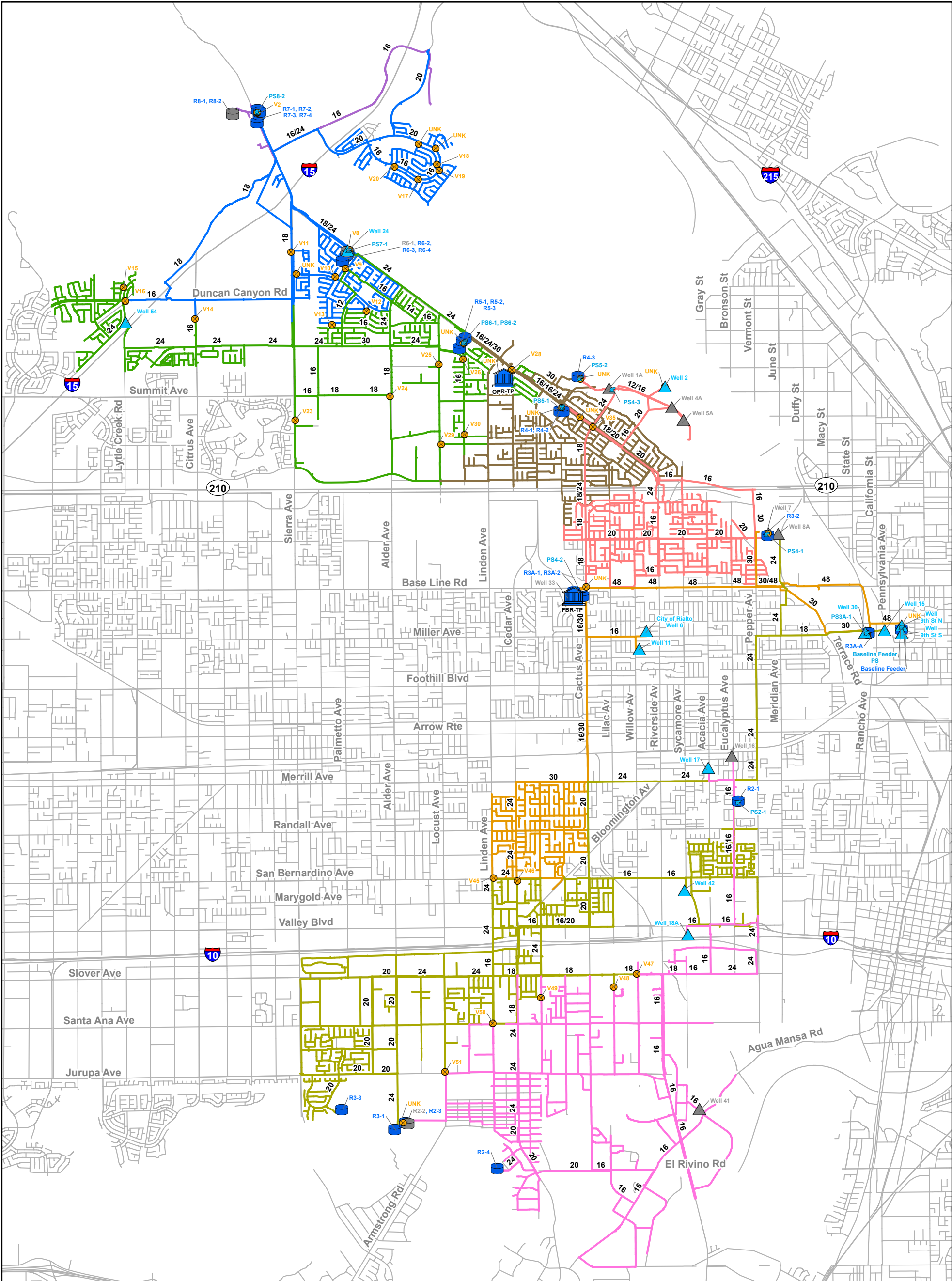


Updated: March 13, 2019



File Path: P:\GIS\GIS\_Projects\West Valley WDW\WDW\_Fig 4.2\_ExistingSystem\_031319.mxd



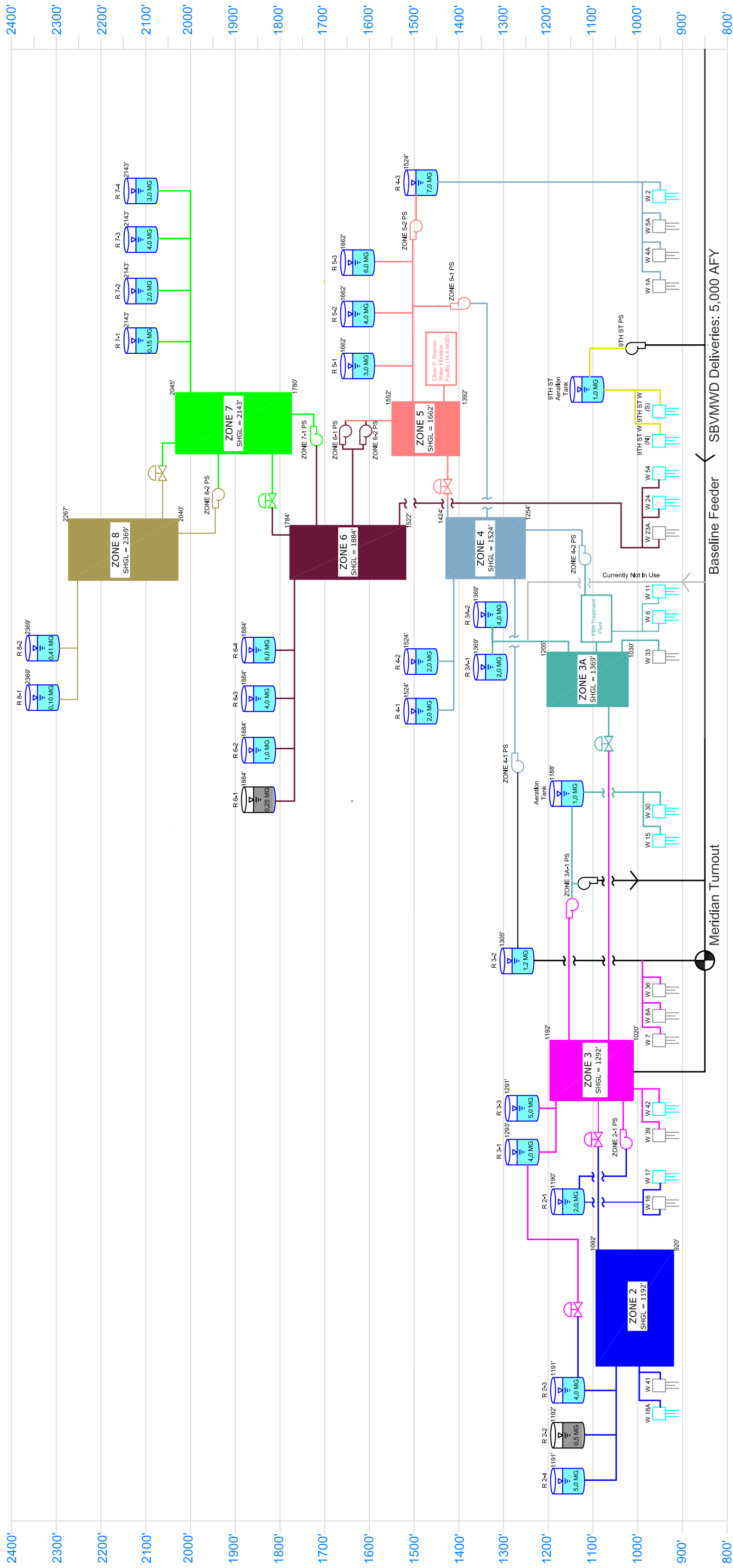


**Legend**

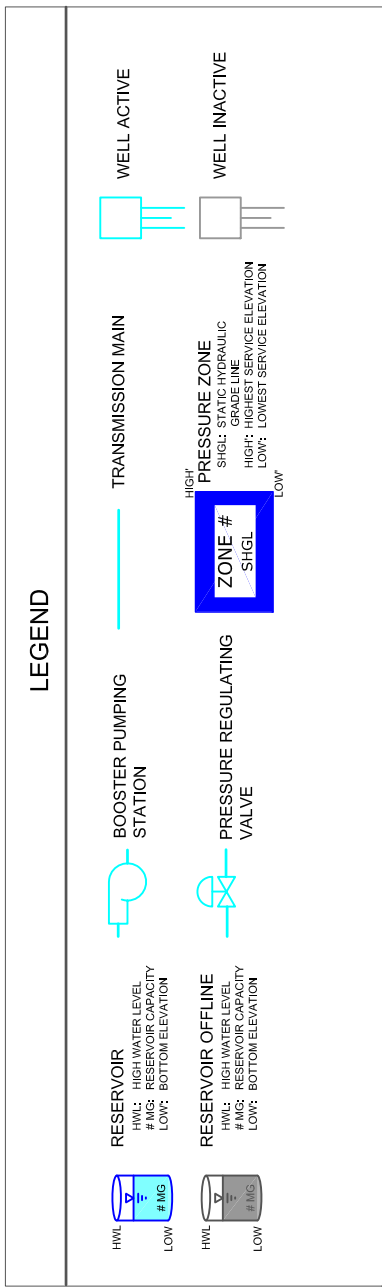
Existing System	Pumps	Pipes by Pressure Zone	Zone 5
Tanks	Valves	Zone 2	Zone 6
Inactive Tanks		Zone 3	Zone 7
Active Wells		Zone 3A	Zone 8
Inactive Wells		Zone 4	Street Centerlines

**PRELIMINARY**

**Figure 4.3**  
**Existing System Pipes**  
**by Pressure Zone**  
 Water Facilities Master Plan  
 West Valley Water District



**Figure 4.4**  
Existing Hydraulic  
Profile Schematic  
WATER FACILITIES MASTER PLAN  
WEST VALLEY WATER DISTRICT



PRELIMINARY

Last Updated: 3/7/19

**Table 4.1 Existing Groundwater Wells**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Supply Well	Zone	Groundwater Basin	Location	Pump Test Capacity <sup>1</sup>				Production Capacity <sup>2</sup>	Operational Controls <sup>3</sup>			
				Flow Rate		Total Dynamic Head	Test Year		Low Demand	High Demand		
				(gpm)	(mgd)	(ft)		On (ft)	Off (ft)	On (ft)	Off (ft)	
<b>Active Groundwater Wells</b>												
W-2	4	Lytle Creek	19973 Country Club Drive, Rialto	1,532	2.2	519	2017	1.47	18	20	18	20
W-4A	4	Lytle Creek	5914 N. Sycamore Avenue, Rialto	2,318	3.3	512	2017	2.23	9	11	12	14
W-5A	4	Lytle Creek	5914 N. Sycamore Avenue, Rialto	1,085	1.6	532	2017	1.04	8	10	10	12
W-11 <sup>4</sup>	3A	Rialto	238 W. Victoria St., Rialto	1,346	1.9	465	2017	1.29	VFD			
W-15	2,3,3A	Bunker Hill	1950 W. 9th St. San Bernardino	1,380	2.0	380	2016	1.32	24	26	24	26
W-17	2	Rialto	404 S. Acacia Avenue, Rialto	1,000	1.4		2010	0.96	10	18	10	18
W-18A	2	North Riverside	1783 S. Sycamore Avenue, Colton	2,170	3.1		2010	2.08	16	18	20	22
W-24	6	Rialto	4334 Riverside Avenue, Rialto	475	0.7	145	2017	0.46				
W-30	2,3,3A	Bunker Hill	2015 W. 9th St. San Bernardino	1,520	2.2	375	2016	1.46	22	24.5	22	24.5
W-42	3	North Riverside	295 E. San Bernardino Avenue, Rialto	1,625	2.3	578	2017	1.56	20	22	24	26
W-54	6	Rialto	Duncan Canyon Road, Fontana	920	1.3	930	2017	0.88	16	18	26	28
Rialto W-6 <sup>4</sup>	3A	Rialto	204 W. Etiwanda Ave.	1,870	2.7	451	2017	1.80	VFD			
				<b>Total Well Capacity<sup>4</sup></b>				<b>15.26</b>				
				<b>Firm Well Capacity<sup>4</sup> (largest unit out of service)</b>				<b>13.03</b>				
<b>Inactive Groundwater Wells</b>												
W-1A	4	Lytle Creek	19523 Country Club Drive, Rialto	822	1.2	367.1	2017	0.79				
W-7	3,4	Lytle Creek	6871 Martin PMP, San Bernardino	1,100	1.6		2010	1.06				
W-8A	3,4	Lytle Creek	6871 Martin Road, San Bernardino	1,700	2.4		2010	1.63				
W-41	2	North Riverside	3353 Industrial, Rialto	2,104	3.0	376.4	2016	2.02				
W-16		Rialto	296 S. Eucalyptus Avenue, Rialto	1,550	2.2		2010	1.49				
W-33	3A	Rialto	855 W Baseline Road, Rialto	2,517	3.6	425.3	2017	2.42				
W-23A	6	Rialto	4334 Riverside Avenue, Rialto	200	0.3		2010	0.19				
W-36	3,4	Lytle Creek	20600 Walnut Avenue, San Bernardino									
W-39	3	Chino	10272 Cedar Place, San Bernardino County					0.89				

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Notes:

1. Source: Pump tests received from District staff August 2, 2017.
2. Production capacity assumes operating time of 16 hours per day.
3. Source: Operational control document received from District staff August 31, 2017.
4. Well 11 and Rialto Well 6 both feed the District's Groundwater Wellhead Treatment System (FBR); only one well operates at any given time.



#### 4.2.1 Groundwater Supply and Treatment Facilities

The District has 21 existing production wells, which are summarized on [Table 4.1](#); this includes 12 active and nine inactive groundwater wells. As shown on [Table 4.1](#); the firm capacity of the District's active groundwater wells is approximately 13,600 gpm. Rehabilitation, including water treatment, is needed to bring the remaining eight non-operational wells into production. The Kleinfelder firm was included as part of this team to evaluate the water supply and quality of the District's production wells.

Some wells are adversely impacted by contaminants, both human-caused and naturally occurring, which may limit the ability to use them as a source for consumption. The following documents the wells and their limiting water quality contaminant:

- **Arsenic:** Wells W-8A, W-36 and W-2
- **Perchlorate:** Wells W-16, W-17, W-18A, W-33, W-41 and W-42
- **Nitrate:** Wells W-16, W-18A, W-22A, W-39, and W-42

The District monitors groundwater quality and the movement of the groundwater contaminants, and in response to water quality concerns, groundwater treatment at the wellhead have been installed by the District on some wells. For example, well W-2 has Arsenic treatment and coagulation, and well W-11 has Perchlorate treatment.

A fluidized bed reactor (FBR) facility was constructed at the District's headquarters to remove perchlorate and nitrates. The FBR facility currently is used for perchlorate removal from the groundwater produced by wells W-11 and W-6. The process involves pumping groundwater from the two wells to the FBR, and additional downstream treatment facilities are utilized prior to discharge into the system, including: post-aeration tanks for treated water oxygenation, media filtration for solids removal, and a filtered water tank with a chlorination system for disinfection.

#### 4.2.2 Surface Water Supply

The Oliver P. Roemer Water Filtration Facility (Roemer WFF) treats raw water from Lytle Creek, and is supplemented with State Water Project (SWP) water from Silverwood Lake. The facility is designed to treat local Lytle Creek water, imported SWP water, and a blend of the two. Kleinfelder, included on the Master Plan team, evaluated the Roemer WFF and provided discussion and recommendations.

The current capacity of the Roemer WFF is 14.4 mgd. This treatment facility has a current maximum treatment capacity of 14.4 mgd with plans to expand to 20.4 mgd. The planned expansion assumes the construction of a 6.0 mgd membrane filtration plant. Two additional lead-lag granular activated carbon (GAC) vessel systems were installed in 2017. [Appendix B](#) documents figures from the previous master plan that include a flow schematic of the Roemer WFF and a plant site diagram of the Roemer WFF.

The current Roemer WFF consists of influent water blending ponds, rapid mixing/coagulation, flocculation, sedimentation and dual-media filtration. Filtered water is treated with GAC to remove volatile organic compounds (VOCs) and odor and taste contaminants; the filtered water ultimately is disinfected with ultraviolet (UV) light. The finished product water is chlorinated using free chlorine for further virus deactivation and to provide residual disinfectant in the distribution system.

The Roemer WFF also integrates auxiliary facilities including two filter backwash water ponds, three sludge disposal and drying ponds, multiple flow controlling/splitting structures, chemical storage building, Lytle Creek pump station, water distribution pump station, multiple intermediate pumping systems, electrical/power supply and instrumentation and control installations.

It should be noted that the City of Rialto owns 1.5 mgd of the Lytle Creek treated flows. Currently, the District delivers these flows through a connection with the City of Rialto at their Cedar Reservoir site, along Cedar Avenue south of Persimmon Avenue. The District delivers approximately 1.2 mgd, which can increase to the City of Rialto's owned capacity of 1.5 mgd depending on Lytle Creek flows.

#### **4.2.3 Baseline Feeder Pipeline**

Beginning in 1998, the District began receiving water through what is known as the Baseline Feeder (BLF) pipeline. This pipeline was constructed in a joint venture with the City of Rialto and San Bernardino Valley Municipal Water District (SBVWMD). The current agreement with SBVWMD allows the District to receive up to 5,000 afy of supply through this 48-inch transmission pipeline.

In 2012, two new groundwater wells, along with an aeration tank and pump station, were constructed as part of the Baseline Feeder Well Replacement and Improvement project, which was implemented to provide adequate supply to meet the District's 5,000 afy allotment. Before this time the District received an average of 2,700 afy due to diminishing operational capacity of the original SBVWMD BLF supply wells.

Water is currently delivered to the existing system through the following two facilities.

##### **4.2.3.1 Meridian Turnout**

The District receives water delivered through the BLF pipeline using a control structure at the intersection of Baseline Road and Meridian Avenue. This control structure, known as the Meridian Turnout, currently regulates the delivery of water to the District at the following locations:

- North from Baseline Road to the Lord Ranch Facility via a 24-inch pipeline
- South from Baseline Road to Pressure Zone 3 via a 24-inch pipeline

Based on current operating conditions, the Meridian Turnout prioritizes maintaining the level of the water storage reservoir 3-2, which serves as a forebay reservoir for pump station 4-1. Excess water in the BLF not required to maintain the tank level is transferred south to Pressure Zone 3.

#### **4.2.3.2 Lord Ranch Facility**

The District currently relies on pump stations to transfer supply delivered via the BLF to Pressure Zone 4 and the higher North System pressure zones. Pump Station 4-1 is currently utilized as the primary pump station to convey BLF deliveries to Pressure Zone 4, and is referred to as the Lord Ranch Facility. This facility is currently comprised of a forebay water storage reservoir (Reservoir 3-2), and Pump Station 4-1. Water is delivered to the forebay reservoir via a 24-inch pipeline from the Meridian Turnout. A new pump station planned for this facility will be the primary pump station to transfer future water extracted from the Bunker Hill groundwater basin to Pressure Zone 4.

### **4.3 PRESSURE ZONES**

The District's service area generally slopes upward from south to north, with service elevations ranging between 900 ft and 2,300 ft. Due to the varying terrain, the service area is divided into eight pressure zones to account for the changes in elevation.

#### **4.3.1 Zone 2 (SHGL = 1,192 feet)**

Zone 2 is the southernmost zone in the District's southern system. It is generally bounded by the Santa Ana River and Riverside/San Bernardino County Line to the south, Locust, Maple and Cedar Avenues to the west, Interstate 10 to the north and Pepper Avenue to the east.

Elevations served in this pressure zone range from approximately 920 feet to 1,092 feet. This zone is supplied from one groundwater well (Well 18A) as well as PRVs from Zone 3; this zone has 3 active ground level storage reservoirs for a total storage capacity of 11.0 MG.

#### **4.3.2 Zone 3 (SHGL = 1,292 feet)**

Zone 3, located within the District's southern system, is separated into two distinct areas that are divided by the City of Rialto. The first area is generally bounded by Sierra Avenue to the west and Zone 2 to the east, with San Bernardino Avenue and the Riverside/San Bernardino County Line serving as the northern and southern boundaries respectively. The second area is generally bounded by Sycamore Avenue to the west and Pepper Avenue to the east, with Randall Avenue and Interstate 10 serving as the northern and southern boundaries respectively.

Elevations served in this pressure zone range from approximately 1,020 feet to 1,192 feet. This zone can be supplied from multiple locations, which are summarized as follows:

- Baseline feeder pipeline through the Meridian Turnout
- Well 17 supply, which first enters Reservoir 2-1, before being boosted into the Pressure Zone by the 2-1 Booster Station.

- Direct supply from Well 42
- Wells 15 and 30 supply, which first enters Aeration Tank 3A-1, before being boosted into the Pressure Zone by the 3A-1 Booster Station.
- PRVs from Zone 3A

This zone has three storage reservoirs for a total storage capacity of 10.2 MG.

#### **4.3.3 Zone 3A (SHGL = 1,369 feet)**

Zone 3A is the northernmost zone in the District's southern system. It is generally bound by Merrill Avenue to the north and San Bernardino Avenue to the south, with Linden Avenue and Cactus Avenue serving as the western and eastern boundaries respectively.

Elevations served in this pressure zone range from approximately 1,030 feet to 1,205 feet. This zone can be supplied from multiple locations, which are summarized as follows:

- The Fluidized Bed Reactor (FBR) treatment plant, which treats groundwater from well 11 and the City of Rialto well 6,
- Baseline feeder pipeline through the Meridian Turnout

This zone has two storage reservoirs for a total storage capacity of 6.0 MG.

#### **4.3.4 Zone 4 (SHGL = 1,524 feet)**

Zone 4 is the southernmost zone of the District's northern system. It is generally bound by Highland Avenue to the north and Baseline Road to the south, with Cactus Avenue and the Southern Pacific Railroad serving as the western and eastern boundaries respectively

Elevations served in this pressure zone range from approximately 1,254 feet to 1,424 feet. This zone is currently supplied by pump station 4-1 and pump station 4-2 as well as PRVs from Zone 5. This zone has three storage reservoirs for a total storage capacity of 11.0 MG, which includes pumping storage for Zones 5, 6, 7, and 8.

#### **4.3.5 Zone 5 (SHGL = 1,662 feet)**

Zone 5 is located within the District's northern system and generally bound by Summit Avenue to the north and Highland Avenue in the south. Maple Avenue and Linden Avenue serve as the western boundary while the Lytle Creek wash serves as the eastern boundary.

Elevations served in this pressure zone range from approximately 1,392 feet to 1,552 feet. This zone is supplied by the Roemer WFF as well as booster stations 5-1 and 5-2, which draw water from Zone 4. This zone has three storage reservoirs for a total storage capacity of 13.0 MG, which includes pump storage for Zones 6, 7, and 8.

**4.3.6 Zone 6 (SHGL = 1,884 feet)**

Zone 6, located within the District’s northern system, is generally bound by Duncan Canyon Road and Casa Grande Drive to the north and Highland Avenue to the south; Sierra Avenue and Brookside Avenue generally serve as the western boundaries while the Lytle Creek wash serves as the eastern boundary.

Elevations served in this pressure zone range from approximately 1,522 feet to 1,784 feet. This zone is supplied from booster stations 6-1 and 6-2, which draw water from Zone 5, as well as PRVs from Zone 6; this zone has 3 active storage reservoirs for a total storage capacity of 11.0 MG, which includes pumping storage for Zones 7 and 8.

Zone 6 includes two subzones: Zone 6A, and Zone 6B. Zone 6A includes the developed area bound to the north by Summit Avenue and Lowell Street, Locust Avenue to the east, Foothill Freeway to the south and Sierra Avenue to the west. Zone 6B is bound to the north and west by Zone 6A, with Maple Avenue and Highland Avenue generally serving as the eastern and southern boundaries respectively.

**4.3.7 Zone 7 (SHGL = 2,143 feet)**

Zone 7, located within the District’s northern system, is bounded to the south by pressure zone 6, and bounded north by the San Bernardino National Forest, then along the Interstate 15 to Glen Helen Regional Park. Elevations served in this pressure zone range from approximately 1,780 feet to 2,045 feet. This zone is supplied from booster station 7-1, which draws water from Zone 6, as well as PRVs from Zone 8; this zone has 4 storage reservoirs for a total storage capacity of 9.2 MG, which includes pumping storage for Zone 8.

Pressure Zone 7 includes two subzones: Zone 7A, and Zone 7B. Zone 7A serves the residential development along Sycamore Creek Loop. Zone 7B is generally south of Terra Vista Drive, between Riverside Avenue and Citrus Avenue.

**4.3.8 Zone 8 (SHGL = 2,369 feet)**

Pressure Zone 8 is the northernmost zone in the District’s northern system and is generally north of Glen Helen Parkway, with Sierra Avenue and Clearwater Parkway serving as the western and eastern boundaries respectively.

Elevations in this pressure zone range from approximately 2,040 feet to 2,267 feet. This zone is supplied from booster stations 8-1 and 8-2, which draw water from Zone 7; this zone has two storage reservoirs for a total storage capacity of 0.51 MG.

**4.4 TRANSMISSION AND DISTRIBUTION PIPELINES**

Supply is pumped directly into the District’s distribution system via 375 miles of pipeline, with diameters ranging from pipelines less than 6-inches in diameter to 48-inch pipelines. The District



maintains a robust transmission system, with approximately 60 miles of pipeline greater than or equal to 18-inches in diameter. The existing system pipelines are documented on [Figure 4.2](#), and color-coded by pipe size. Similarly, [Figure 4.3](#) documents the existing system, and color-coded by pressure zone serviced.

An inventory of existing pipes, extracted from the GIS-based hydraulic model and used in this analysis, is included in [Table 4.2](#). For each pipe diameter, the inventory lists the length in feet, as well as the total length in units of miles. Additionally, standard pipe roughness coefficients used for various materials are included for reference on [Table 4.3](#).

## 4.5 STORAGE RESERVOIR

Storage reservoirs are typically incorporated in the water system to provide water supply for operation during periods of high demand, for meeting fire flow requirements, and for other emergencies, as defined in the District's planning criteria.

The District's existing storage reservoirs are summarized on [Table 4.4](#), along with their capacity, high water level, tank height, and construction type. These reservoirs are also shown on the hydraulic profile schematic ([Figure 4.4](#)), the high water level and bottom tank elevations. The District maintains a robust system storage capacity, in excess of 71 million gallons.

## 4.6 BOOSTER STATIONS

Water is conveyed from the lower pressure zones to the higher pressure zones via a series of booster pump stations ([Table 4.5](#)). Water is extracted from various sources, including surface water from Lytle Creek and purchased State Water Project water treated at the Oliver P. Roemer Water Filtration Facility, the Bunker Hill Basin water delivered through the Baseline Feeder, and groundwater wells. This water is then boosted throughout the water system by an interconnected transmission network.

[Table 4.5](#) lists the location, design capacity, and individual pump information at each pump station. Operational controls for the booster pumps are controlled to turn "on" or "off" depending on their assigned storage reservoirs, as listed in this table.

## 4.7 PRESSURE REDUCING VALVES

There are several sub-pressure zones that are pressure reducing valve (PRV) dependent within the existing system. Other PRVs act as emergency connections between pressure zones in case of a catastrophic failure. An inventory of the PRVs, their size, location, pressure zone serviced and settings are included on [Table 4.6](#).

**Table 4.2 Existing Modeled Pipe Inventory**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Pipe Diameter (in)	Pipe Length By Material										Total (ft)	Total (mile)
	Steel (ft)	Asbestos Cement (ft)	Cast Iron (ft)	Ductile Iron (ft)	PVC (ft)	HDPE (ft)	Unknown (ft)					
<b>Existing Distribution System</b>												
2	3,186	0	255	23	20	0	464			3,948	0.7	
3	586	0	167	0	0	0	43			796	0.2	
4	33,969	12,833	6,186	0	81	0	5,421			58,489	11.1	
6	133,232	155,210	8,011	453	26,841	0	5,953			329,700	62.4	
8	57,416	293,451	6,076	1,858	300,829	0	10,721			670,350	127.0	
10	36,799	79,143	122	30	9,752	0	1,543			127,390	24.1	
12	160,537	115,728	0	431	104,318	0	25,357			406,370	77.0	
14	2,709	0	0	0	0	0	0			2,709	0.5	
16	93,109	11,983	0	19,812	2,163	0	4,315			131,383	24.9	
18	46,114	12,562	0	136	16	0	154			58,981	11.2	
20	50,480	7,864	0	10,040	13	0	287			68,684	13.0	
22	0	0	0	0	0	0	47			47	0.0	
24	94,076	24,214	2,174	16,787	31	279	3,393			140,956	26.7	
30	33,615	14,545	0	1,059	0	0	1,732			50,951	9.6	
36	2,568	0	0	0	0	0	117			2,685	0.5	
<b>Total</b>	<b>748,396</b>	<b>727,534</b>	<b>22,991</b>	<b>50,629</b>	<b>444,064</b>	<b>279</b>	<b>59,547</b>			<b>2,053,440</b>	<b>388.9</b>	
<b>Baseline Feeder Pipeline</b>												
<b>Total</b>	<b>19,735</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>286</b>			<b>20,021</b>	<b>3.8</b>	



Note:

1. Pipeline length and material based on GIS data provided by District Staff, as included in the 2017 Water System Hydraulic Model.

10/3/2017

**Table 4.3 Pipe Roughness Coefficients**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Pipe Material	0	10	20	30	40	50
	Age (years)					
<b>Asbestos Cement</b>	125	125	125	125	125	125
<b>Cast Iron</b>	120	110	100	90	85	80
<b>Ductile Iron</b>	130	125	120	115	110	105
<b>Plastic (PVC)</b>	145	145	140	140	135	135
<b>Steel</b>	130	120	110	100	90	80



Note:

1. At age=0, the roughness coefficients are commonly used values for new pipes. Roughness coefficients decrease with age at a rate that depends on pipe material.
2. Pipes with an unknown material or age were assigned a roughness coefficient of 110.

9/29/2017

**Table 4.4 Existing Storage Facilities**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Designation	Capacity (MG)	High Water Level (ft)	Tank Height (ft)	Type of Construction
<b>Zone 2</b>				
R2-1	2.00	1,190	29.0	Reinforced Concrete
R2-2 (Inactive)	0.50	1,192	30.0 <sup>2</sup>	Welded Steel
R2-3	4.00	1,191	31.0	Welded Steel
R2-4	5.00	1,191	31.0	Welded Steel
<b>Subtotal (Active Facilities)</b>	<b>11.00</b>			
<b>Zone 3A</b>				
R3A-1	2.00	1,369	18.0	Reinforced Concrete
R3A-2	4.00	1,369	23.0	Welded Steel
<b>Subtotal</b>	<b>6.00</b>			
<b>Zone 3</b>				
R3-1	4.00	1,293	33.0	Welded Steel
R3-2	1.20	1,305	32.0	Welded Steel
R3-3	5.00	1,292	31.0	Welded Steel
<b>Subtotal</b>	<b>10.20</b>			
<b>Zone 4</b>				
R4-1	2.00	1,524	24.0	Reinforced Concrete
R4-2	2.00	1,524	19.0	Reinforced Concrete
R4-3	7.00	1,524	24.0	Welded Steel
<b>Subtotal</b>	<b>11.00</b>			
<b>Zone 5</b>				
R5-1	3.00	1,662	24.0	Reinforced Concrete
R5-2	4.00	1,662	23.5	Welded Steel
R5-3	6.00	1,662	24.0	Reinforced Concrete
<b>Subtotal</b>	<b>13.00</b>			

**Table 4.4 Existing Storage Facilities**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Designation	Capacity (MG)	High Water Level (ft)	Tank Height (ft)	Type of Construction
<b>Zone 6</b>				
R6-1 (Inactive)	0.25	1,885	24.0	Welded Steel
R6-2	1.00	1,884	24.0	Welded Steel
R6-3	4.00	1,884	31.0	Welded Steel
R6-4	6.00	1,884	31.0	Welded Steel
<b>Subtotal (Active Facilities)</b>	<b>11.00</b>			
<b>Zone 7</b>				
R7-1	0.15	2,143	23.5	Welded Steel
R7-2	2.00	2,143	23.0	Welded Steel
R7-3	4.00	2,143	23.5	Welded Steel
R7-4	3.00	2,143	23.5	Welded Steel
<b>Subtotal</b>	<b>9.15</b>			
<b>Zone 8</b>				
R8-1	0.10	2,369	24.0	Welded Steel
R8-2	0.41	2,363	18.0	Welded Steel
<b>Subtotal</b>	<b>0.51</b>			
<b>Total Storage Capacity</b>				
	<b>71.86</b>			

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5/19/2017

Note:

1. Unless noted otherwise, storage facility information extracted from West Valley Water District 2012 Water System Master Plan
2. Source: Tank information received from district staff October 30, 2017.



**Table 4.5 Existing Booster Pump Stations**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Designation No.	Location	Source Pressure Zone	Destination Pressure Zone	Design Capacity <sup>1</sup>	Operational Capacity <sup>2</sup>		Operational Controls <sup>4</sup>				
					Total (mgd)	Hours or operation	Firm <sup>3</sup> (mgd)	Low Demand On	Low Demand Off	High Demand On	High Demand Off
Zone 2 to Zone 3 Transfer PS	Zone 2-1 Reservoir	2	3	1,500 gpm (1 pump)	1.4	16.0	0.0	19.0	21.0	23.0	25.0
FBR Treatment Facility		-	3A	2,000 gpm	2.9	24.0	2.9				
Zone 3A-1 PS <sup>3</sup>	2015 9th St	3, 3A	3, 3A	3,500 gpm @ 210' (2 pumps, Z3A) 3,400 gpm @ 150' (2 pumps, Z3)	20.0	16.0	16.6	18.0	20.0	22.0	24.0
Zone 4-1 PS	6871 Martin Rd	3	4	2,000 gpm @ 240' (2 pumps) 1,100 gpm @ 240' (1 pump)	4.9	16.0	3.0	10.0	12.0	13.0	15.0
Zone 4-2 PS	855 Baseline Rd	3A	4	2,400 gpm @ 170' (3 pumps)	6.9	16.0	4.6	7.0	9.0	9.0	11.0
Zone 4 Transfer PS	Zone 4-3 Reservoir	4	4	5,000 gpm (1 pump)		As Needed					
Zone 5-1 PS <sup>4</sup>	5700 Riverside Ave	4	5	3,000 gpm @ 170' (4 pumps)	11.5	16.0	8.6	9.0	11.0	13.0	15.0
Zone 5-2 PS	At Reservoir R4-3	4	5	3,200 gpm @ 181' (6 pumps)	18.4	16.0	15.4	10.0	12.0	14.0	16.0
Oliver P. Roemer WFF Effluent Pumps	3010 Cedar Ave	-	5	1,800 gpm @ 130' (4 pumps)	10.4	24.0	7.8				
Zone 6-1 PS <sup>4</sup>	5210 Riverside Ave	5	6	2,200 gpm @ 230' (3 pumps) 1,850 gpm @ 235' (1 pump) 850 gpm @ 220' (1 pump)	8.9	16.0	6.8	14.0	16.0	24.0	26.0
Zone 6-2 PS	5210 Riverside Ave	5	6	2,590 gpm @ 265' (6 pumps)	14.9	16.0	12.4	15.0	17.0	25.0	27.0
Zone 7-1 PS	4334 Riverside Ave	6	7	2,200 gpm @ 280' (3 pumps) 1,300 gpm @ 280' (1 pump)	7.6	16.0	5.5	16.0	18.0	20.0	22.0
Zone 8-1 PS	3434 Lytle Creek Rd	7	8	280 gpm @ 225' (1 pump) 175 gpm @ 225' (1 pump)		As Needed					
Zone 8-2 PS	3296 Lytle Creek Rd	7	8	1,630 gpm @ 252' (4 pumps)	6.3	16.0	4.7	10.0	16.5	10.0	16.5

9/25/2017

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Notes:

1. Source - West Valley Water District 2012 Water Master Plan
2. Excluding the Roemer WFF and FBR Treatment plant, production capacity assumes operating time of 16 hours per day.
3. Firm capacity defined as total pump capacity excluding largest pump.

**Table 4.6 Existing Pressure Reducing Valves**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Valve ID	Location	Size (in)	Pressure Zone		Settings	
			Upstream	Downstream	Upstream	Downstream
<b>Zone 8</b>						
V2	8-2 Pump Station	10	8	7	111	N/A
<b>Zone 7</b>						
V8	Riverside (By Zone 7-1 PS)	12	7	7B	120	80
V9	Live Oak & Via Bello	8	7	7B	-	-
V10	Dove Tree & Terra Vista	8	7	7B	-	-
V11	North Sierra, across from school	8	7	7B	Not in Use	
V12	Terra Vista & Tamarind	8	7	6	95	60
V13	Goldenrod & Sunrise	8	7	6	-	-
V14	Citrus 1/4 mile south of Duncan Canyon	8	7	6	-	-
V15	Six M Ranch Ln & Cloudcrest Way	8	7	6	Not in Use	
V16	Duncan Canyon & Coyote Canyon South side	8	7	6	190	80
V17	Sweet bay and Sycamore Creek	8	7	7A	140	73
V18	Kimberlite & Sycamore Creek	8	7	7A	140	80
V19	Black Cottonwood & Sycamore Creek	8	7	7A	140	92
V20	Eve Primrose Ln & Sycamore Creek	8	7	7A	140	80
<b>Zone 6</b>						
V23	South Sierra, Sierra & Summit	8	6	6A	-	-
V24	End of Alder (by Target warehouse)	12	6	6A	105	75
V25	Locust (by fireworks factory)	12	6	6A	115	75
V26	Maple (top near bend)	8	6	6A	114	70
V27	Linden South of Riverside	8	6	6A	-	-
V28	Riverside and Cedar	6	6	6A	140	75
V29	Locust and Bohnert	8	6A	6B	112	82
V30	Maple and Banyon	6	6A	6B	120	70
<b>Zone 5</b>						
V35	Riverside and Cactus	8	5	4	-	-
<b>Zone 3</b>						
V44	San Bernardino and Linden	16	3A	3	-	-
V45	San Bernardino and Linden	12	3A	3	-	-
V46	San Bernardino and Cedar	12	3A	3	-	-
V47	Slover near Willow	12	3	2	-	-
V48	Lilac below Slover	8	3	2	-	-
V49	Larch and Buckskin	8	3	2	-	-
V50	Santa Ana and Linden	10	3	2	-	-
V51	Locust and Jurupa	12	3	2	-	-

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9/25/2017

Notes:

1. Source: Control valve inventory received from District staff August 3, 2017.

## CHAPTER 5 – WATER DEMANDS AND SUPPLY CHARACTERISTICS

This chapter summarizes existing domestic water demands, discussed available supply characteristics, and projects the future domestic water demands.

### 5.1 EXISTING DOMESTIC WATER DEMANDS

The existing water demands used for this master plan were based on the District's 2016 water billing consumption records as well as total annual production. The existing water demands in this analysis are adjusted to match the annual production records and account for system losses.

The existing demand distribution, by pressure zone, was obtained from the water billing records. Using GIS, each customer account was geocoded to its physical location within its existing pressure zone. The accounts were then sorted by pressure zone and the total demand in each zone was calculated.

The District's existing average day domestic water demands, as extracted from the water billing records, were lower than the total demands listed in the annual production records due to system losses that occurred between the groundwater wells and customer service connections. In 2016 this water loss volume was approximately 6% of the total water produced by the District. For evaluation purposes the total domestic water demands were adjusted to reflect the 2014 production volume less 10%. This adjustment accounts for continuing changes in customer water use in response to State-mandated drought measures. The existing domestic water demands used in the evaluation, for each pressure zone, are summarized by pressure zone on [Table 5.1](#).

### 5.2 FUTURE DOMESTIC WATER DEMANDS

Future demands were projected using the unit factors for residential and non-residential land uses and included the developments within the District service area. [Table 5.2](#) organizes the future land use categories and their corresponding domestic water demands. It should be noted that the existing domestic water demands in [Table 5.2](#) were calculated using the recommended water unit factors, which take into account future water conservation practices, and are intended to represent the water use practices of customers at the buildout of the master plan horizon. The total average day domestic water demands from existing and future developments is calculated at 31.6 mgd.

These demands were used in sizing the future infrastructure facilities, including distribution mains, storage reservoirs, and booster stations. Demands were also used for allocating and reserving capacities in the existing or proposed facilities. [Table 5.1](#) summarizes the buildout water demand for each pressure zone.

**Table 5.1 Demands by Pressure Zone**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Pressure Zone	Demands by Pressure Zone						
	Existing <sup>1</sup>	5-Year Growth <sup>2</sup>		Buildout <sup>3</sup>			Total Peak Day Demands <sup>4</sup> (mgd)
	New Demand (mgd)	Subtotal (mgd)	New Demand (mgd)	Total Average Day Demands (mgd)	Increase from Existing (%)		
<b>South System Pressure Zones</b>							
2	2.7	2.8	0.1	4.6	72%	7.7	
3	3.9	4.1	0.3	6.6	72%	11.3	
3A	1.0	1.1	0.0	1.1	7%	1.9	
<b>Subtotal</b>	<b>7.6</b>	<b>8.0</b>	<b>0.4</b>	<b>12.3</b>	<b>63%</b>	<b>20.9</b>	
<b>North System Pressure Zones</b>							
4	2.0	2.0	0.0	2.3	16%	3.9	
5	2.0	2.6	0.7	2.8	43%	4.8	
6	3.2	4.4	1.2	6.8	114%	11.6	
7	2.5	4.0	1.6	6.5	165%	11.1	
8	0.2	0.5	0.3	0.9	276%	1.5	
<b>Subtotal</b>	<b>9.8</b>	<b>13.5</b>	<b>3.7</b>	<b>19.3</b>	<b>97%</b>	<b>32.8</b>	
<b>System-Wide Demands</b>							
	<b>17.4</b>	<b>21.5</b>	<b>4.2</b>	<b>31.6</b>	<b>82%</b>	<b>53.7</b>	



Notes:

9/13/2019

1. Average day demands based on 2014 production less 10%, where the demand distribution by pressure zone is based on 2016 water billing records
2. Demands due to 5-Year growth based on development information provided by District Staff.
3. Future demands based on additional growth due to buildout of General Plan Land Use.
4. Peak Day Demand = 1.7 x Average Day Demand
5. The demands shown in this table include system losses.

**Table 5.2 Buildout Average Daily Water Demands**

Water Facilities Master Plan  
West Valley Water District

Land Use Classifications		Buildout Water Demands												
		Existing Development				Future Development to be Serviced within Planned Area Boundary								
		Within Service Area		Average Daily Demand		New Development		Future Water Unit Factor		Average Daily Demand		Sphere of Influence		Total
Existing Development (net acre)	Water Unit Factor (gpd/net acre)	Average Daily Demand (gpd)		New Development (net acre)	Future Water Unit Factor (gpd/net acre)	Average Daily Demand (gpd)	Existing Development (net acre)	New Development (net acre)	Future Water Unit Factor (gpd/net acre)	Average Daily Demand (gpd)	Total Development within SOI (net acre)	Average Daily Demand (gpd)		
<b>Residential</b>														
Residential 2	1,074	990	1,063,695		921	990	912,078	0	6	990	5,842	2,002	1,981,614	
Residential 6	3,614	2,650	9,577,035		2,136	2,650	5,660,863	0	5	2,650	14,234	5,756	15,252,132	
Residential 12	0	4,580	0		556	4,580	2,544,483	0	27	4,580	124,527	583	2,669,010	
Residential 21	83	5,630	468,282		545	5,630	3,069,456	0	57	5,630	319,248	685	3,856,986	
<i>Subtotal Residential</i>	4,772		11,109,011		4,158		12,186,880	0	95		463,851	9,025	23,759,741	
<b>Non-Residential</b>														
Commercial	58	1,800	105,083		927	1,800	1,668,923	0	18	1,800	32,621	1,004	1,806,627	
Retail	4	1,890	7,317		180	1,890	339,845	0	0	1,890	0	184	347,162	
Office	9	1,410	12,207		55	1,410	77,652	0	0	1,410	0	64	89,859	
Educational	299	1,790	534,407		84	1,790	149,565	0	0	1,790	0	382	683,972	
Institutional	8	1,410	10,866		475	1,410	669,137	0	0	1,410	0	482	680,003	
Public Facility	53	250	13,324		131	250	32,761	0	0	250	0	184	46,085	
Light Industrial	324	500	161,978		422	500	210,874	0	0	500	0	746	372,852	
Heavy Industrial	162	1,530	248,184		480	1,530	735,142	0	0	1,530	0	643	983,325	
Industrial	1,161	1,000	1,160,728		1,072	1,000	1,071,836	0	0	1,000	0	2,233	2,232,564	
<i>Subtotal Non-Residential</i>	2,077		2,254,094		3,825		4,955,735	0	18		32,621	5,921	7,242,450	
<b>Other</b>														
Utilities	223	10	2,230		362	10	3,618	0	0	10	0	585	5,849	
ROW	35	0	0		75	0	0	0	0	0	0	110	0	
Landscape Irrigation	77	2,690	207,367		124	2,690	333,334	0	25	2,690	66,291	226	606,992	
Open Space	0	0	0		2,015	0	0	0	195	0	0	2,210	0	
<i>Subtotal Other</i>	335		209,598		2,576		336,952	0	219		66,291	3,130	612,841	
<b>Totals</b>	7,184		<b>13,572,703</b>		10,559		17,479,567	0	333		562,763	18,076	<b>31,615,032</b>	

2/10/2017





## 5.3 REGULATIONS IMPACTING DEMAND

The State of California recently enacted Senate Bill 606 and Assembly Bill 1668, which regulate water demands based on user categories and establish planning targets for indoor and outdoor water use. These laws establish a target of maximum indoor residential water use of 55 gpcd by the year 2025, and a target of 50 gpcd by 2030. The State Water Resources Control Board is also expected to provide guidance on the calculation of indoor and outdoor water use from commercial, industrial and institutional uses, and similar targets, which are expected by 2022. These regulations are likely to establish long term water use reductions, which will impact supply and infrastructure planning.

## 5.4 DIURNAL DEMAND PATTERNS

Water demands vary with the time of day and by account type according to the land use designation. These fluctuations were accounted for in the modeling effort and evaluation of the water distribution system. The diurnal demand patterns affect the water levels in storage reservoirs and amount of flow through distribution mains.

Using available SCADA data provided by District staff, unique diurnal curves were developed for the Pressure Zones 3, 3A, 4, 5, 6, and 7. These patterns were developed using a mass balance method for each pressure zone, using the pump station flow in, pump station flow out, and the change in storage volume to estimate the fluctuation in zone demand. As shown on [Figure 5.1](#) and [Figure 5.2](#), the hourly demand multipliers by pressure zone range from a maximum of 2.3 in Pressure Zone 6 to a minimum of 0.3 in Pressure Zone 5. The diurnal patterns were confirmed during the calibration effort of the District's hydraulic model and corresponding SCADA information.

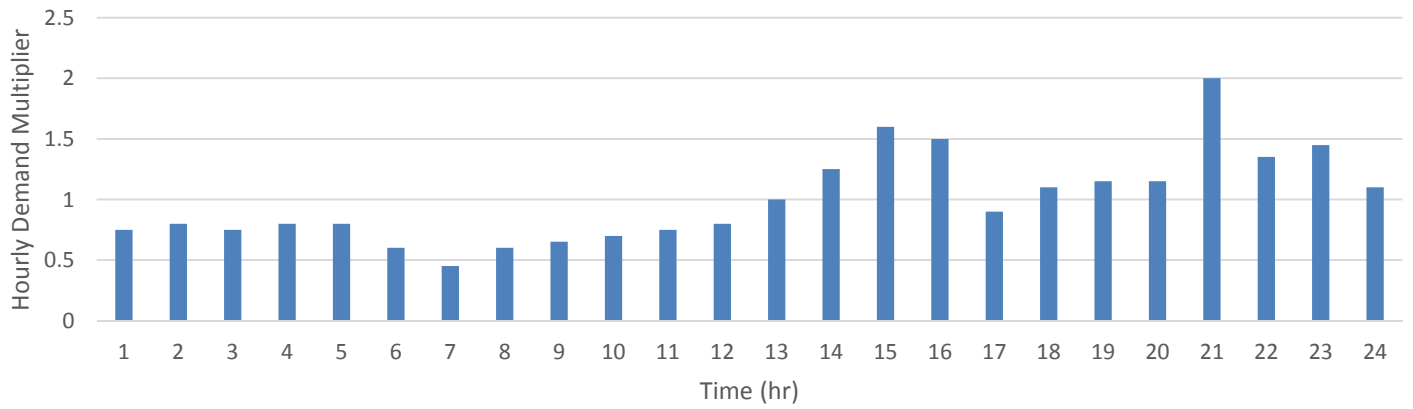
## 5.5 WATER SUPPLY CHARACTERISTICS

In order to meet the existing domestic water demands, the District utilizes several sources of supply, including groundwater and treated surface water. Some supply sources are subject to constraints that can impact the availability and reliability. The following sections summarize the supply sources and the related constraints, as well as documents the assumptions utilized in planning the supply-related improvements intended to meet future demands at the buildout.

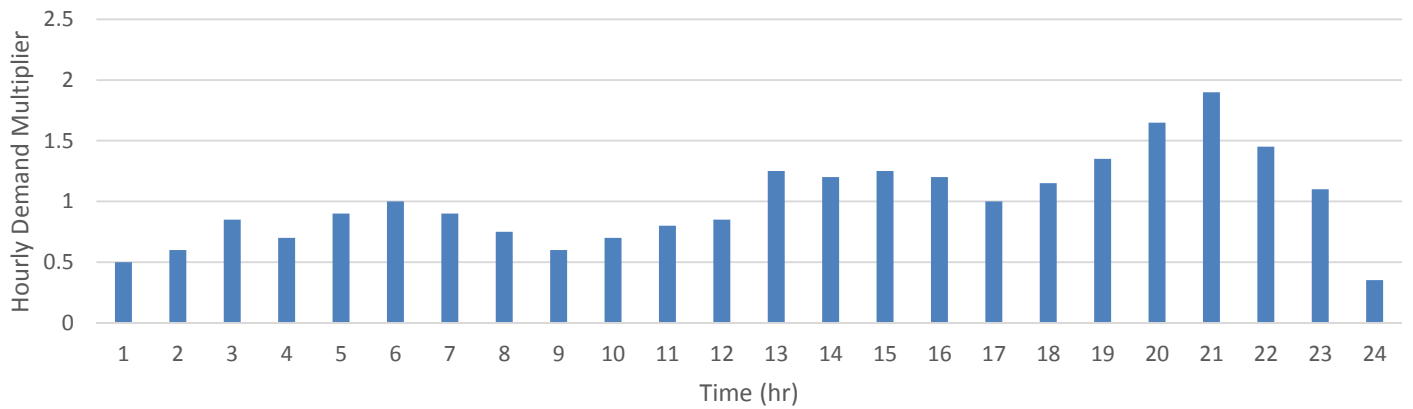
### 5.5.1 Groundwater Supply Sources and Constraints

As discussed in a previous chapter, the District currently utilizes multiple wells to extract groundwater for delivery to existing water system customers. These groundwater wells extract water from five separate groundwater basins, which are shown graphically on [Figure 5.3](#) and briefly summarized on the following pages.

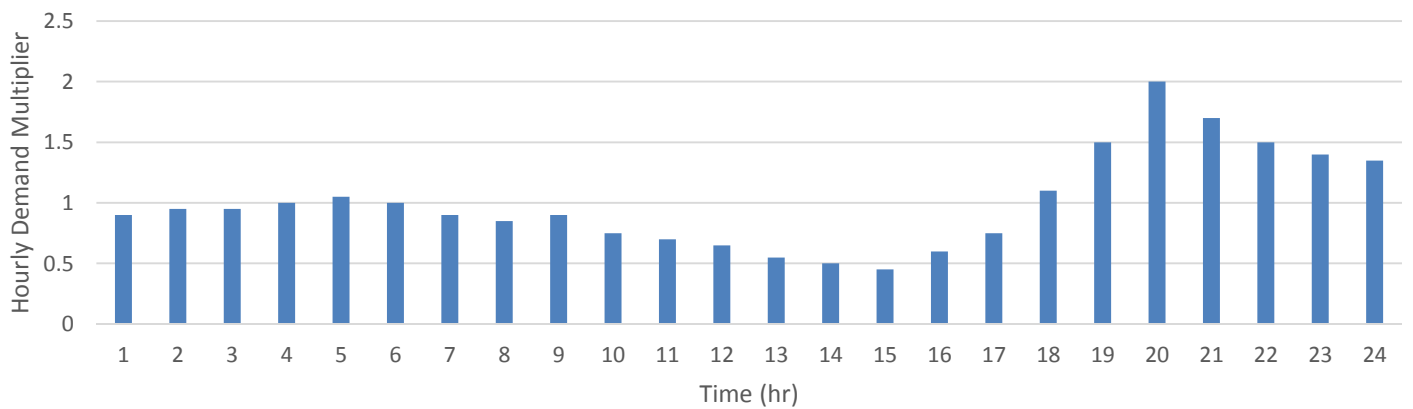
### Zone 2&3 Diurnal



### Zone 3A Diurnal



### Zone 4 Diurnal



**LEGEND**

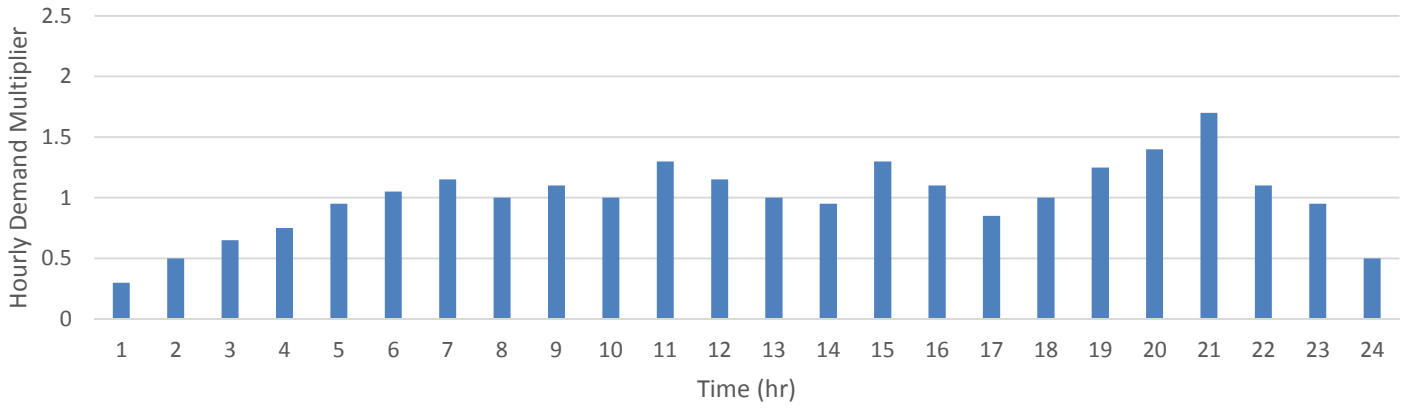
 Hourly Demand Multiplier

**PRELIMINARY**

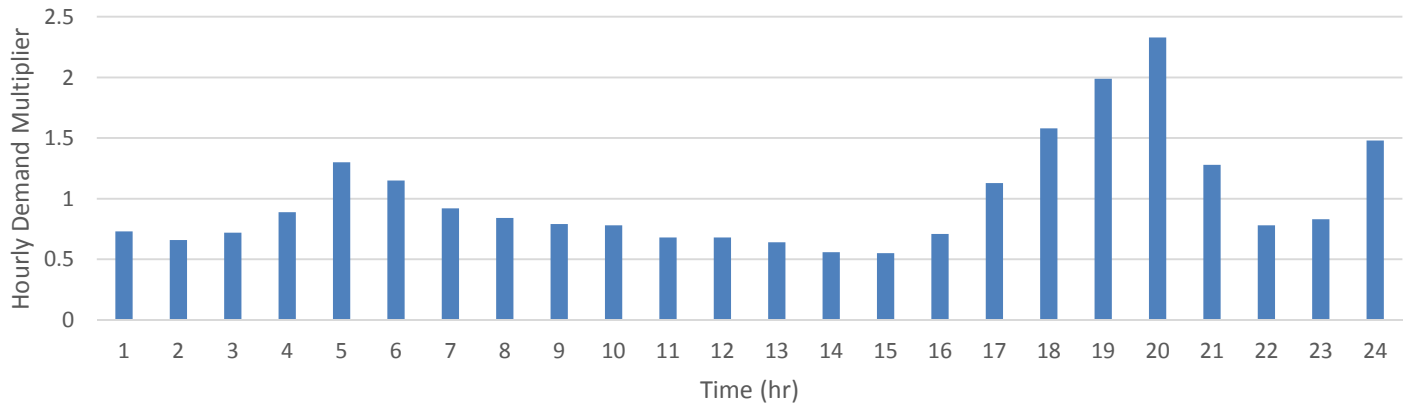
**Figure 5.1**  
**Pressure Zone**  
**Demand Diurnals**  
 Water Facilities Master Plan  
 West Valley Water District



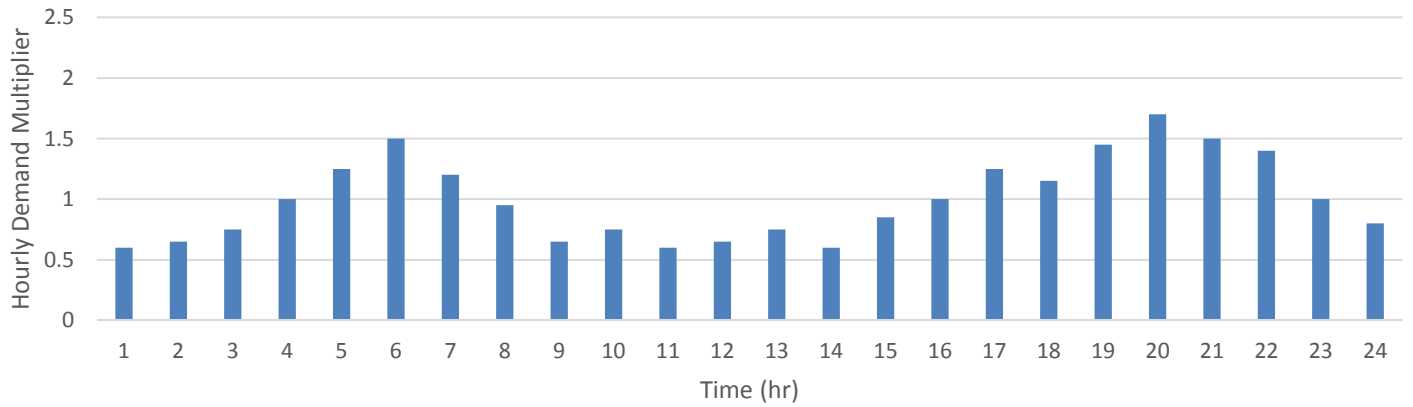
### Zone 5 Diurnal



### Zone 6 Diurnal



### Zone 7&8 Diurnal



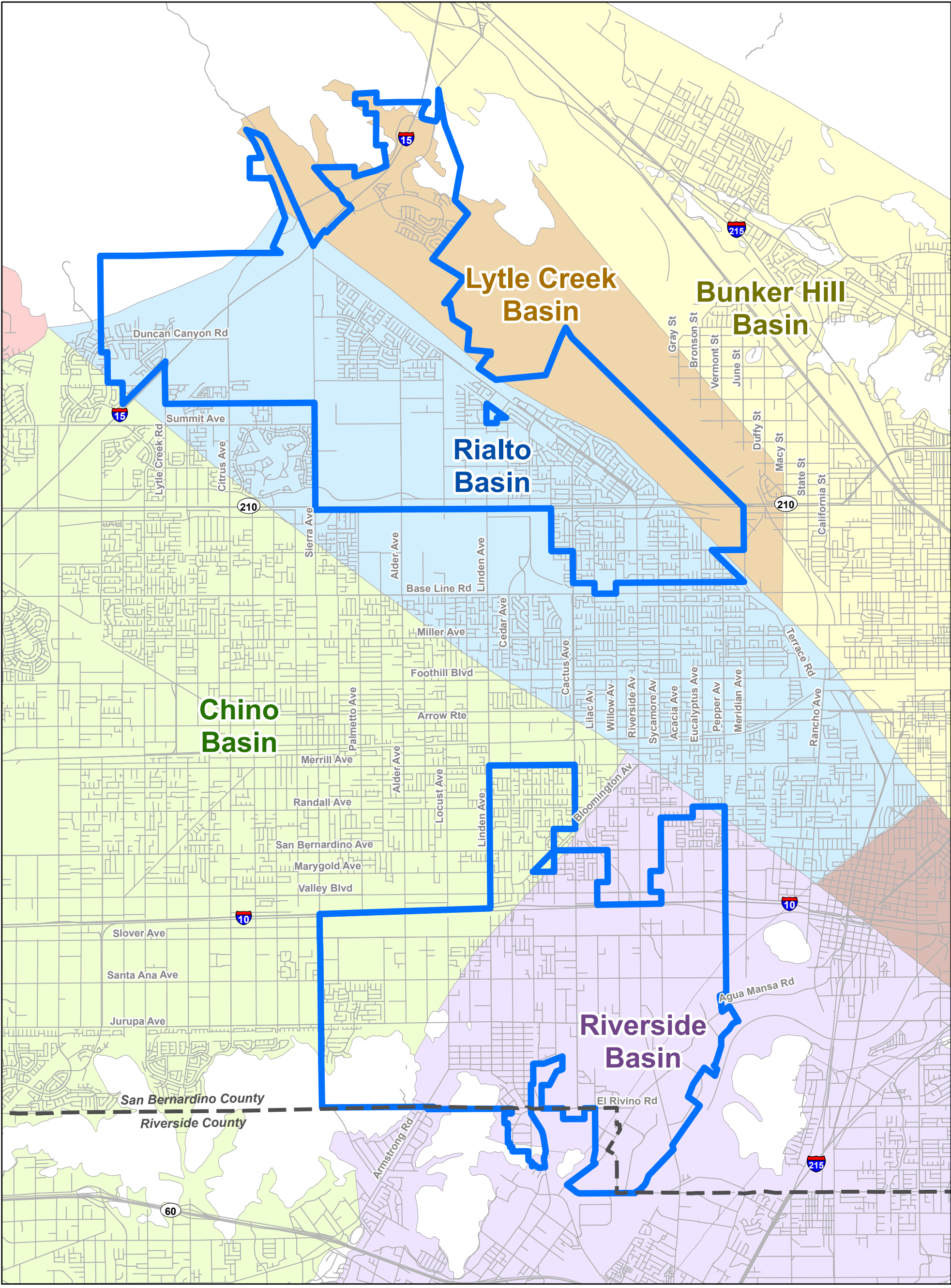
**LEGEND**

 Hourly Demand Multiplier

**PRELIMINARY**

**Figure 5.2**  
**Pressure Zone**  
**Demand Diurnals**  
 Water Facilities Master Plan  
 West Valley Water District





**Legend**

- WVWD Service Area
- County Boundaries
- Groundwater Subbasins**
  - Bunker Hill
  - Chino
  - Colton
  - Cucamonga
  - Lytle Creek
  - Rialto
  - Riverside
- Street Centerlines

**PRELIMINARY**

**Figure 5.3  
Groundwater Subbasins**

Water Facilities Master Plan  
West Valley Water District



### **5.5.1.1 Lytle Creek Basin**

The Lytle Creek groundwater basin is a subbasin of the Bunker Hill groundwater basin, and underlies the northern extent of the District's North System. The subbasin is part of the Upper Santa Ana Valley Groundwater Basin and is generally adjoined to the west by the Rialto-Colton basin along the Lytle Creek fault and along the east and southeast by the remaining portions of the Bunker Hill basin. The San Gabriel Mountains form the northwestern border. It should be noted that DWR Bulletin 118 includes the Lytle Creek subbasin as part of the Bunker Hill basin and does not address it separately. However, the Santa Ana Region Basin Plan identifies this area as a separate management zone, and the District currently refers to it separately in discussions of groundwater quality and quantity from the remaining Bunker Hill basin.

The District's water rights in the Lytle Creek Basin are limited to 12,105 gallons per minute (gpm) if they are diverting their full allotment (2,290 gpm) of surface flow from Lytle Creek. If flows from the Creek are low and the District is receiving a portion of their allotment, they can pump the difference from the wells to a combined maximum of 14,395 gpm from the basin, depending on how much water is available to pump and how much water is available to divert from Lytle Creek. The District has no restrictions on how much it can pump and serve within the Lytle Creek Region.

The basin is an adjudicated groundwater basin and is managed by the Lytle Creek Water Conservation Association. The basin is highly porous and easily replenished during heavy precipitation years. Well production in the basin varies as the basin levels change from year to year.

The quality of groundwater in the Lytle Creek basin is characterized with arsenic contamination, in particular Well No 36 (not currently in use). Currently, only well W-2 has coagulation-based wellhead treatment to remove arsenic before its water is used for water supply.

### **5.5.1.2 Bunker Hill Basin**

The Bunker Hill groundwater basin adjoins the eastern boundary of the District's North System. The basin is part of the San Bernardino Basin Area and is generally adjoined to the west by the Lytle Creek basin and the Rialto-Colton basin

The extractions in the Bunker Hill basin are governed by the Western Judgement. The Western Judgment defined and adjudicated the San Bernardino Basin Area in 1969, and allocates percentages of the safe yield volume to the various agencies capable of extracting water from the basin.

The District has unrestricted water rights in the Bunker Hill basin, but has restrictions on pumping and exporting from certain areas of the basin as is defined in the 1924 Judgment for Lytle Creek Region and as defined in a City of San Bernardino Municipal Water Department's Basin Management Ordinance.



Plumes of various chemical pollutants have been detected in the Bunker Hill groundwater basin requiring installation of treatment to protect basin water quality. Currently, the District has two operational wells producing high quality water for water supply without any regulated contaminants requiring treatment. The Bunker Hill Basin is expected to be a reliable long-term water supply source able to make up shortfalls in water supply that could be caused by long-term droughts.

The District has two existing wells in the Bunker Hill Basin (Wells W-15 and W-30) within the defined area of the 1924 Judgment for the Lytle Creek Region.

In addition to the two existing wells, the District and the City of Rialto by agreement with the SBVMWD, have renewed a contract for a project to pump groundwater from the Bunker Hill Basin through a 48-inch diameter pipeline known as the BLF. The agreement requires that SBVMWD provide a supply up to 5,000 afy to the District (5.76 mgd).

The District owns one third of the BLF from Meridian Avenue to the Cactus Reservoir. This can provide up to 14,000 gpm of capacity in the pipeline. The additional capacity in the pipeline may be utilized for pumping water from the Bunker Hill Basin into the Baseline Reservoirs (R3A-1 and R3A-2). Additional agreements in the future may provide for more purchased water from SBVMWD or the City of San Bernardino or the District could drill additional wells to meet ultimate water demand.

#### ***5.5.1.3 Rialto-Colton Basin***

The Rialto-Colton basin underlies a majority of the District's North System. The basin is generally bounded to the northwest by the San Gabriel Mountains, the San Jacinto fault to the northeast, and the Rialto-Colton fault to the southwest, with the Santa Ana River traversing the southeastern portion of the basin.

Extractions in the Rialto-Colton basin are governed by the 1961 Rialto Basin Decree. Based on the groundwater elevations for three specific index wells verified between March and May of each year, the extraction entitlement for the District may be limited. Water levels in the Basin have declined in recent years, reducing the amount of groundwater extractions. Steps are being taken to formulate a long term strategy to manage the basin.

When the basin is not subject to restrictions by the adjudication, the District has unlimited extraction rights. During drought conditions, and when the adjudication is in effect, the extraction right ranges from 6,134 afy during drought periods to 3,067 afy in the most severe drought periods.

Since 2002, the Santa Ana River Water Quality Control Board (SARWQCB) has been conducting an investigation of groundwater contamination in the area of the City of Rialto. This site has also been designated as a Superfund site by the US EPA. Water quality of the Rialto Basin is characterized with elevated concentrations of perchlorate and nitrate, thus requiring treatment and



reducing its ability to be a reliable water supply. Currently installed wellhead treatment systems utilize ion exchange (IX) and fluidized bed reactor (FBR) treatment to mitigate perchlorate and nitrate contamination.

During years when the average elevation of the spring-high water levels in the three index wells is below 967.7 feet above mean sea level, the amount of water which the stipulated parties are entitled to pump from the Basin is reduced one percent (1%) for each foot. The average elevations of the spring-high water levels for the October 1, 2017 through the September 30, 2018 water year is 931.3 feet above mean sea level, or 38.4 feet below 969.7 feet mean sea level, thus reducing the District's extractions from the Basin by thirty-eight percent (38%).

#### **5.5.1.4 Chino Basin**

The Chino basin underlies a portion of the District's South System. The basin is generally bounded to the east by the Rialto-Colton fault, the San Gabriel Mountains to the north, and the Jurupa Mountains and Puente Hills to the south. The Chino Basin consists of about 235 square miles of the Upper Santa Ana River Watershed, and is an alluvial valley that is mainly flat from east to west, and slopes from the north to the south at a one to two percent grade. This basin is among the largest groundwater basins in southern California, with about 5,000,000 acre-feet of water and an unused storage capacity of about 1,000,000 acre-feet.

The Chino basin is an adjudicated groundwater basin and is managed by the Chino Basin Watermaster, which manages the basin through the Chino Optimum Basin Management Plan. Without incurring replenishment costs, the District is entitled to approximately 1,000 afy of groundwater extraction from this subbasin. The District has two wells (W-37 and W-39) in the Chino Basin which can produce 1.4 mgd and 3.8 mgd, but are not currently in service due to high levels of perchlorate and nitrate. The District will have to install wellhead treatment on these wells to take advantage of their pumping ability and the District's rights in the basin.

#### **5.5.1.5 Riverside-Arlington Basin (North Riverside Groundwater Basin)**

The Riverside-Arlington basin underlies a majority of the District's South System. The basin is generally bounded to the north by the Jurupa Mountains, to the northeast by the Rialto-Colton fault, and the Box Springs Mountains and Arlington Mountain to the south, with the Santa Ana River traversing the northern portion of the basin. This groundwater basin is a large alluvial fill basin that is bound by major faults and topographic barriers. Recharge to the basin occurs by the underflow from basins to the north, from the Santa Ana River, and from percolation of surface water runoff from the surrounding uplands.

The extractions in a portion of the North Riverside basin upstream of the Riverside Narrows are governed by the Western Judgement. However, there is no extraction limit for the District's wells in this basin. Water quality of the basin is characterized with elevated concentration of perchlorate and emerging increase of nitrate concentration. The currently installed wellhead treatment system utilize IX to remove perchlorate. The District has identified that some wells located in the basin

present possible contamination with Methyl tert-butyl ether (MTBE). Wells Number 40 and 41 are monitored monthly, however no MTBE has been detected in these wells or any other District wells.

### 5.5.2 Surface Water Supply

The following sections document the District's existing sources of surface water supply, current water supply constraints, and existing surface water quality.

#### 5.5.2.1 Surface Water Supply Sources

As discussed in a previous chapter, the District currently treats two sources of surface water at the Roemer WFF for delivery to existing water system customers: State Water Project water and flow from Lytle Creek. These sources and the related reliability are briefly summarized in the following sections and shown on [Table 5.3](#).

- Lytle Creek.** The District has 5.09 cubic feet per second (2,290 gpm), water right in Lytle Creek surface water and has entered into an agreement with the City of San Bernardino to purchase the City of San Bernardino's 3.00 cfs (1,350 gpm) water rights for a total of 8.09 cfs (3,640 gpm or 5.2 mgd) of Lytle Creek surface water. The City of San Bernardino, due to infrastructure limitations, is unable to utilize its rights and divert water from the Creek. The District also has a court settlement agreement with Fontana Union Water Company for approximately one percent (1%) of Fontana Union Water Company's annual water production to be taken at the District's WFF. This is approximately 320 acre feet per year, or 200 gpm. The City of Rialto has 2.3 cfs water rights. The District, the City of Rialto, and the City of San Bernardino, have a combined capacity of 10.39 cfs (6.7 mgd) of Lytle Creek surface water rights.

In 1993, the District and the City of Rialto jointly constructed the Oliver P. Roemer WFF, a 7.2 mgd water treatment plant, in Pressure Zone 5, to treat 6.7 mgd of Lytle Creek surface water. The facility produced approximately 5.2 mgd annual average daily flow of supply to the District and approximately 1.5 mgd for the City of Rialto from Lytle Creek.

Lytle Creek surface water flows fluctuate seasonally and the District and City of Rialto's water right could be prorated whenever the Lytle Creek water flow is below 800 miner inches (16 cfs). When the Lytle Creek surface water flow drops below 16 cfs, the water right of both the District and the City of Rialto are subject to proration. In addition to the flow fluctuation, the turbidity of Lytle Creek surface water flow also varies seasonally.

- State Water Project.** The District currently imports SWP water from SBVMWD through the Lytle Turnout off of the San Gabriel Feeder Pipeline. This SWP water is delivered to the Roemer WFF and treated in addition to the Lytle Creek flows. Recently constructed

**Table 5.3 Water Supply Portfolio**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Source	Maximum Water When Available <sup>1</sup> (AFY)	Imported Water <sup>1</sup> (AFY)	Historical Water Use <sup>2</sup>						
			2011 (AFY)	2012 (AFY)	2013 (AFY)	2014 (AFY)	2015 (AFY)	2016 (AFY)	2017 (AFY)
<b>Surface Water</b>									
Imported SWP <sup>3</sup>		No Limit	400	849	1,194	1,643	2,244	2,839	2,653
Lytle Creek	5,870 <sup>4</sup>		4,203	4,700	3,110	2,363	2,271	2,026	4,540
Other Surface Water									
<b>Groundwater Basins<sup>5</sup></b>									
Lytle Creek Basin	19,500 <sup>6</sup>		2,983	4,002	3,776	3,262	2,159	1,850	2,365
Bunker Hill Basin	No Restrictions		1,335	1,682	1,885	1,478	1,520	1,351	2,300
Chino Basin	1000 <sup>7</sup>		0	0	0	0	0	0	0
Rialto-Colton	No Restrictions <sup>8</sup>		4,883	4,093	4,005	3,916	2,505	2,123	3,923
Riverside-Arlington	No Restrictions		3,144	3,932	3,389	2,992	2,065	2,745	1,089
Total Groundwater Use			12,345	13,709	13,055	11,648	8,249	8,069	9,677
<b>Other Water Sources</b>									
Purchased GW through Baseline Feeder Pipeline		5,000	3,020	1,990	3,350	4,819	4,367	3,380	3,151
<b>Total Historical Water Use</b>			<b>19,968</b>	<b>21,248</b>	<b>20,709</b>	<b>20,473</b>	<b>17,131</b>	<b>16,314</b>	<b>20,022</b>

1/28/2019



Note:

1. Source: WAWD 2012 Water System Master Plan.
2. Unless noted otherwise, historical water use extracted from Water System Statistics provided by WAWD Staff on September 25, 2018.
3. Water imported from the SWP is purchased from San Bernardino Valley Municipal Water District.
4. The District has a 3,700 AFY water right to Lytle Creek and has entered into an agreement with the City of San Bernardino to purchase the City's 2,170 AFY water right for a total of 5,870 AFY water right to Lytle Creek
5. Historical water use by groundwater basin extracted from the following:  
 Years 2011-2015: WAWD 2015 Urban Water Management Plan, Table 11-10.  
 Year 2016: Basin data provided by WAWD staff on January 28, 2019.  
 Year 2017: Groundwater basin production report provided by WAWD staff on September 24, 2018.
6. During extended periods of drought well production in Lytle Creek Basin is projected to be reduced. However, there is no maximum amount of water that can be pumped and served within the Lytle Creek Basin region.
7. The District's water rights are limited to approximately 1000 AFY without incurring replenishment costs.
8. When the basin adjudication is in effect the extractions rights range from 6,134 AFY to 3,067 AFY depending on the severity of the drought.

metering and transmission facilities will enable the District to import and treat up to 20 mgd upon the completion of the Roemer WFF capacity expansion. It should be noted that the SWP water is considered an interruptible water supply, and while historically reliable, the potential disruption of SWP water deliveries are accounted for when planning future water infrastructure facilities.

### **5.5.3 Water Supply Planning**

In order to meet the growing demand requirements of the District service area and provide additional water supply reliability, the existing water supply capacity will require expansion. This expansion will include the rehabilitation of existing groundwater wells, the construction of new groundwater wells, and the expansion of the Roemer WFF treatment plant, which are generally described in the following sections.

#### **5.5.3.1 Rehabilitate Existing Wells**

The District currently has multiple groundwater wells that are inactive due to water quality constraints or other operational issues. The rehabilitation of these existing wells will increase the District's supply capacity and multiple sites have infrastructure in place to facilitate the delivery of water to the existing water distribution system. The rehabilitation of these existing wells is considered the first priority for planning water supply improvements, which is reflected in the supply capacity analysis and recommended improvements discussed in a later chapter.

#### **5.5.3.2 Construct New Wells**

New groundwater wells are required to meet the expanded needs of the planning area boundary. The well locations shown in this WFMP are preliminary and are intended as placeholders for planning purposes. The location of future groundwater wells will be determined based on site feasibility studies completed as part of the design process. The general assumptions for the recommendation of new wells are documented as follows:

- Due to the availability of water supply in the Bunker Hill groundwater basin the development of future wells is recommended. However, as an alternative to constructing new groundwater wells the District could also enter into contract to receive deliveries of Bunker Hill water through the Baseline Feeder pipeline.
- As discussed in a previous section, Pressure Zone 2 receives a majority of its supply by PRV from Pressure Zone 3. To limit this supply dependency, new wells are recommended to meet the buildout development demand requirements within Pressure Zone 2.

#### **5.5.3.3 Roemer WFF Treatment Expansion**

The Roemer WFF has a current treatment capacity of 14.4 mgd. The District has plans to expand the capacity by an additional 6.0 mgd, which will increase the total treatment capacity to 20.4 mgd. Based on the 4,000 afy (3.6 mgd) of projected Lytle Creek flows, it is estimated that

approximately 16.8 mgd total of SWP water could be purchased to utilize the full treatment capacity of the Roemer WFF.

#### **5.5.4 Surface Water Quality**

Lytle Creek and State Water Project are the two sources of surface water currently used for the

District's surface water supply. Lytle Creek, which is a perennial stream in the upper watershed, is a local surface water that is treated for domestic water use. During the summer for short periods, Lytle Creek surface water flow will drop below 16 cfs, which causes the District's water rights to be subject to proration. Turbidity, microbiological contaminants and other surface water-typical constituents characterize the quality of the water from Lytle Creek.

The District has been utilizing water from the State Water Project since 1999. The current metering and transmission facilities allow the District to import 20 mgd (23,000 afy) of the SWP water. Quality of the SWP water is characterized with elevated concentration of total organic carbon (TOC). Traditionally, the District imports and treats the SWP water for potable water supply at the Roemer WFF.

#### **5.5.5 Other Water Sources**

This section documents other sources of water supply, both existing and potential, that are available to the District. This section was completed by Kleinfelder.

##### **5.5.5.1 Baseline Feeder**

The water supply of the Baseline feeder comes from SBVMWD-owned wells in the Bunker Hill Basin. The current agreement with SBVMWD allows the District to receive up to 5,000 afy of supply. The District could investigate additional supply through the BLF.

##### **5.5.5.2 Alternative Water Sources**

No other water source is currently being utilized by the District. However, due to climate change and severe droughts, the District is considering the feasibility of developing alternative source of water supplies including but not limited to water banking, storm water run-off collection and recyclable water. Capacity and water quality of these alternative sources are not defined at this point in time. Further study of potential yields and treatment methodologies will need to be completed prior to implementing new water sources. Treatments may include removal of turbidity, oil, heavy metals, microbiological contaminants, and other regulated water quality constituents may be necessary. As opportunities arise and technology advances, it is recommended that the District continue to explore the possibility of expanding its water supply portfolio and developing new sources of water supply.



### 5.5.6 Current and Future Regulations

The US EPA has set mandatory water quality standards in the National Primary Drinking Water Regulations (NPDWRs) for inorganics, organic chemicals, disinfectant and disinfection by-products, and microbiological contaminants. The US EPA recommends secondary non-enforceable National Secondary Drinking Water Standards (NSDWSs) for 15 contaminants that may cause aesthetic effects on potable water. The quality of the District's potable water is in full compliance with local, state and federal regulatory requirements.

The pending regulations that may be of importance for the District and its water supply system include:

- California DDW's recommendations to establish a lower perchlorate detection limit for purposes of reporting. If proved technically and economically feasible and beneficial to the public health, the current perchlorate MCL of 6 parts per billion (PBB) may be revised.
- The Lead and Copper Rule will be updated in 2018 to incorporate EPA changes and lessons learned from the water crisis in Flint, Michigan.
- Development of a new unregulated contaminant monitoring regulation. DDW is in the process of gathering information on the presence and concentration of contaminants of concern in potable water systems. If deemed necessary, the DDW may choose to regulate, or increase regulation, of some of these contaminants in the future.

Although not currently utilized by the District, the pending new regulation for water reuse, including recycled water and water for potable reuse, may be important for the District's future water supply.

## CHAPTER 6 - HYDRAULIC MODEL DEVELOPMENT

This chapter describes the development and calibration of the District's domestic water distribution system hydraulic model. The hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

### 6.1 OVERVIEW

Hydraulic network analysis has become an effectively powerful tool in many aspects of water distribution planning, design, operation, management, emergency response planning, system reliability analysis, fire flow analysis, and water quality evaluations. The District's hydraulic model was used to evaluate the capacity adequacy of the existing system and to plan its expansion to service anticipated future growth.

### 6.2 MODEL SELECTION

The District's hydraulic model combines information on the physical characteristics of the water system (pipelines, groundwater wells, and storage reservoir) and operational characteristics (how they operate). The hydraulic model then performs calculations and solves a series of equations to simulate flows in pipes and calculate pressures at nodes or junctions.

There are several network analysis software products that are released by different manufacturers, which can equally perform the hydraulic analysis satisfactorily. The selection of a particular software depends on user preferences, the distribution system's unique requirements, and the costs for purchasing and maintaining the software.

The District's previous model was developed using the Innozyze (formerly known as MWHSoft) H2ONet, which allows for steady-state and extended period simulations within an AutoCAD user interface. As part of this master plan, the hydraulic model was redeveloped into the GIS-based hydraulic model InfoWater by Innozyze. The model has an intuitive graphical interface and is directly integrated with ESRI's ArcGIS (GIS), providing a useful modeling tool linked to the newly developed District GIS.

### 6.3 HYDRAULIC MODEL DEVELOPMENT

Developing the hydraulic model included skeletonization, digitizing and quality control, developing pipe and node databases, and water demand allocation.

#### 6.3.1 Skeletonization

Skeletonizing the model refers to the process where pipes not essential to the hydraulic analysis of the system are stripped from the model. Skeletonizing the model is useful in creating a system that accurately reflects the hydraulics of the pipes within the system, while reducing complexities

of large systems, which will reduce the time of analysis while maintaining accuracy, but will also comply with limitations imposed by the computer program. For the purposes of this master plan, skeletonizing was kept to a minimum due to the integrity of the GIS.

**6.3.2 Pipes and Nodes**

Computer modeling requires the compilation of large numerical databases that enable data input into the model. Detailed physical aspects, such as pipe size, pipe elevation, and pipe lengths, contribute to the accuracy of the model.

Pipes and nodes represent the physical aspect of the system within the model. A node is a computer representation of a place where demand may be allocated into the hydraulic system, while a pipe represents the distribution and transmission aspect of the water demand. In addition, reservoir dimensions and capacities, and groundwater well capacity and design head, were also included in the hydraulic model.

**6.3.3 Digitizing and Quality Control**

The District’s existing domestic water distribution system was digitized in GIS using several sources of data and various levels of quality control. The data sources included the District’s existing system as maintained by staff in GIS, as well as conversation with District staff and record drawings.

After reviewing the available data sources, the hydraulic model was updated and verified by District staff. Resolving discrepancies in data sources was accomplished by graphically identifying each discrepancy and submitting it to engineering and GIS staff for review and comments. District comments were incorporated in the verified model.

**6.3.4 Demand Allocation**

Demand allocation consists of assigning water demand values to the appropriate nodes in the model. The goal is to distribute the demands throughout the model to best represent actual system response.

Allocating demands to nodes within the hydraulic model required multiple steps, incorporating the efficiency and capabilities of GIS and hydraulic modeling software. Existing land use water demand factors were used in conjunction with the existing land use map. Each demand factor was applied to the appropriate land use and then multiplied by the acreage. In the absence of complete water billing records, this methodology was considered the best approach for accurately allocating the existing water demands.

Domestic water demands from each anticipated future development, as presented in a previous chapter, were also allocated to the model for the purpose of sizing the required future facilities. The demands from the greater Planning Area were allocated based on proposed land use and the land use acreages. As many of the areas were very large in size, demands were allocated evenly

to the demand nodes within each area. Infill areas, redevelopment areas, and vacant lands were also included in the future demand allocation.

## 6.4 MODEL CALIBRATION

Calibration is intended to instill a level of confidence in the pressures and flows that are simulated. Calibration generally consists of comparing model predictions to field measured results and making necessary adjustments.

### 6.4.1 Calibration Plan and SCADA

The District relies on multiple sources of supply, including groundwater wells, treated water supply, and water deliveries through the Baseline Feeder. The District maintains SCADA at its tank sites, booster stations, and the Oliver P Roemer Water Filtration Facility. As such, this SCADA information was considered adequate for calibrating the hydraulic model. [Figure 6.1](#) documents each point used in the calibration of the hydraulic model.

District staff provided hourly flow data for each well and booster station, as well as tank levels for each pressure zone for July 2017. This data was further consolidated and compared with daily demand data to best calibrate to peak day conditions.

### 6.4.2 Steady State Calibration

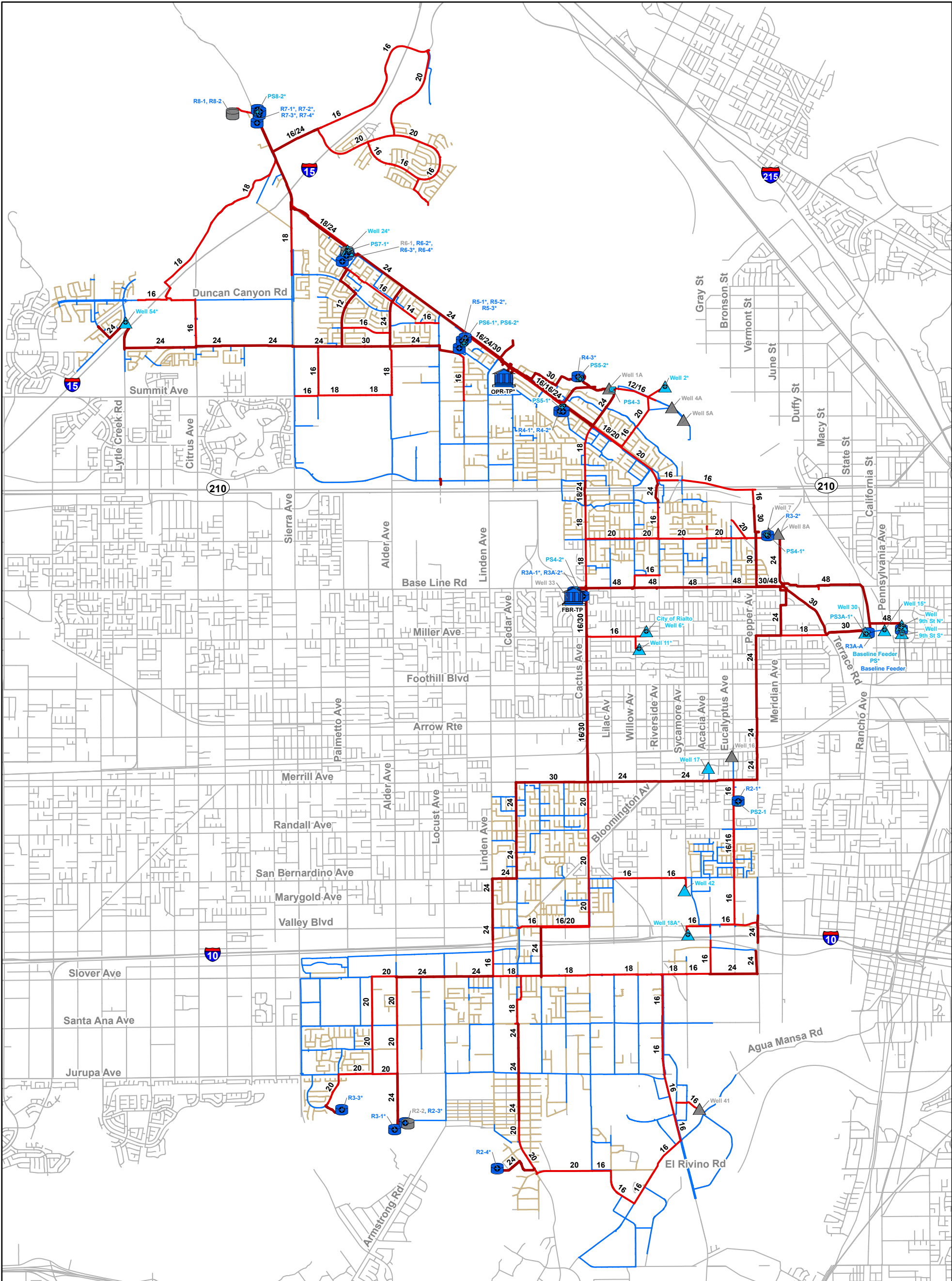
As part of this master plan, a steady-state calibration was performed on the existing system. Steady-state model runs consist of “snapshot” model run where the system is evaluated for a single specified hour. Typically, steady-state model runs are calibrated to fire flow tests, where a static pressure and residual pressure are provided. The model is then simulated for that specific hour and fire flow, and a pressure comparison is completed. The modeled Hazen Williams C-Factor and connectivity are adjusted based on the calibration results.

The steady-state calibration results are documented on [Table 6.1](#). The results generally indicate that the system is in good health. There are robust looped-pipe networks and transmission main connectivity within the existing system, which help to mitigate the negative effects of fire flows.

### 6.4.3 EPS Calibration

The model was also calibrated for extended period simulation (EPS), which typically involved comparing the hydraulic model to field conditions over at least 24 hours. EPS calibration consists of comparing model predictions to diurnal operational changes in the water system. The intent of an extended period simulation

The calibration process was iterative and resulted in satisfactory comparisons between the field measurements and the hydraulic model predictions at each well site. It should be noted that some of the SCADA information at the well sites and the booster station sites were found to be



- Legend**
- \*Model Calibration Point
  - Existing System
  - WTP
  - Tanks
  - Inactive Tanks
  - Active Wells
  - Inactive Wells
  - Pumps
  - Pipes by Diameter
  - 8" and Smaller
  - 10" - 12"
  - 16" - 20"
  - 24" - 48"
  - Street Centerlines

**PRELIMINARY**

**Figure 6.1**  
**Hydraulic Model**  
**Calibration Program**  
 Water Facilities Master Plan  
 West Valley Water District



Updated: February 7, 2018

0 0.25 0.5 1 Mile



File Path: P:\GIS\GIS\_Projects\West Valley WDI\WVWD\_Fig6-1\_ModelCalibration\_020718.mxd



**Table 6.1 Steady State Calibration Results**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Location Number	Pressure Zone	Date	Time	Address of Gauging Hydrant	Static Pressure			Residual Pressure		
					Observed (psi)	Simulated (psi)	Percent Difference	Observed (psi)	Simulated (psi)	Percent Difference
560	2	3/30/16		1350 Brown Ave., Riverside, CA	113	114	1.3%	107	109.63	2.5%
569	4	7/25/16		1571 N Sycamore Avenue, Rialto, CA	71	70	-1.9%	68	65.44	-3.8%
568	3A	8/8/16		654 S. Cactus Avenue, Rialto, CA	73	72	-1.3%	66	65.32	-1.0%
570	2	8/8/16		2755 S Willow Avenue, Bloomington, CA	82	87	6.5%	75	82.48	10.0%
573	5	11/2/16		5891 N Sycamore Avenue, Rialto, CA	80	85	6.0%	74	80.35	8.6%
576	6	11/2/16		2010 W Stonehurst Dr., Rialto, CA	85	86	1.5%	80	79.05	-1.2%
578	5	1/10/17		2092 Spruce Avenue, Rialto, CA	85	83	-1.9%	72	77.17	7.2%
580	3	3/16/17		17132 Slover Avenue, Fontana, CA	75	84	11.5%	74	78.64	6.3%
581	3A	3/16/17		884 S Church Street, Rialto, CA	80	78	-2.0%	76	70.35	-7.4%



Notes:

1. Fire flow locations and results based of historical fire flow tests received from District staff.

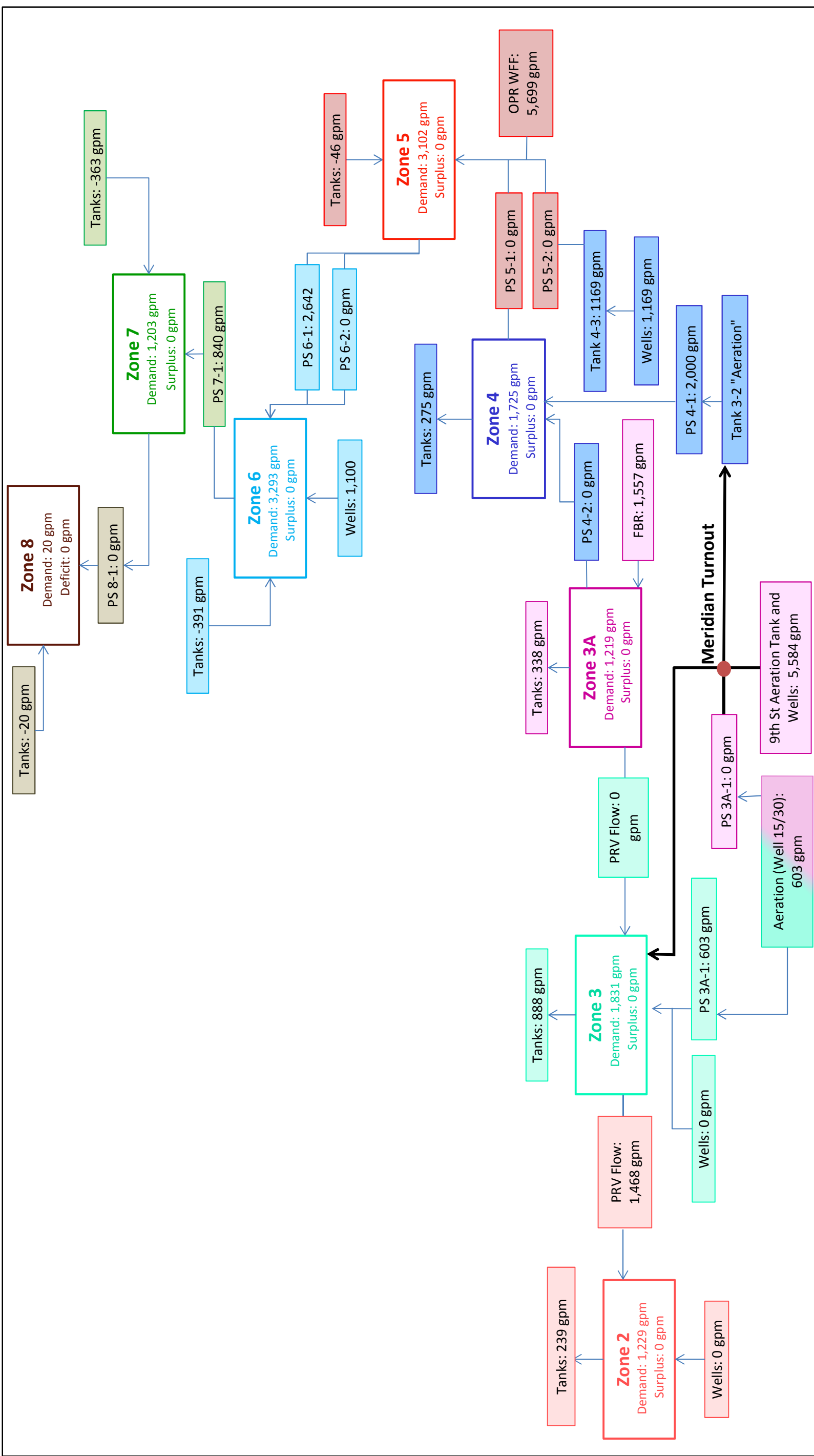
9/11/2017

erroneous. As such, a mass balance of the existing water system by pressure zone was completed and submitted to District staff for review ([Figure 6.2](#)). Calibration information for the wells and the booster stations relied heavily on District staff knowledge of the system, and interpretation of trendlines observed in the SCADA. The calibration results were graphically summarized for each site and included in [Appendix C](#).

Representative extracts from [Appendix C](#) are shown on [Figure 6.3](#) for calibration points at the Zone 5, 6, and 7 storage reservoirs.

#### **6.4.4 Use of the Calibrated Model**

The calibrated hydraulic model was used as an established benchmark in the capacity evaluation of the existing water distribution system. The model was also used to identify improvements necessary for mitigating existing system deficiencies and for accommodating future growth. This valuable investment will continue to prove its value to the District as future planning issues or other operational conditions surface. It is recommended that the model be maintained and updated with recent construction to preserve its integrity.

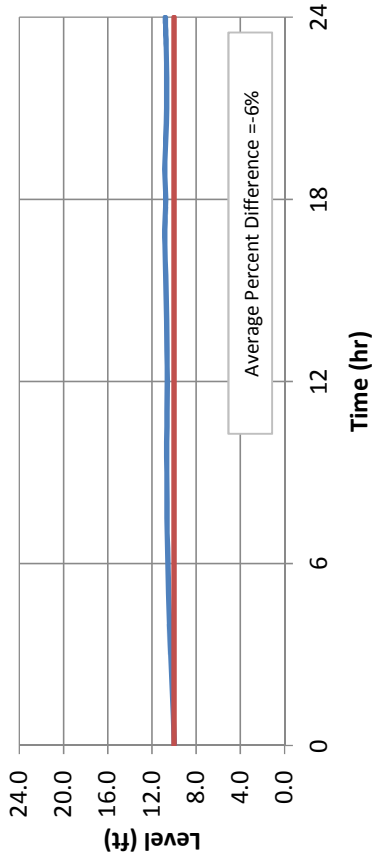


**Figure 6.2**  
**SCADA Mass Balance**  
 Water Facilities Master Plan  
 West Valley Water District

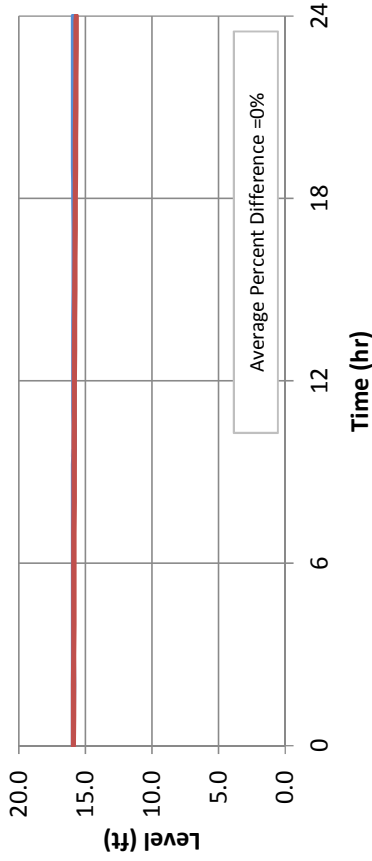
**PRELIMINARY**  
 January 30, 2018

- NOTES**
1. Flow information shown based on SCADA data for July 9, 2017 and additional adjustments based on information provided by WVWD staff.
  2. Zone 8 Tank flow based on modeling results in absence of SCADA data.
  3. Zone demands based on SCADA flows provided by WVWD staff.
  4. Combined Zone 2 and Zone 3 demand assumed to be equal to water supplied to Zone 3. Distribution of Zone 2 and 3 demand based on 2016 production records.
  5. Positive tank flow reflects filling; negative tank flow reflects emptying.

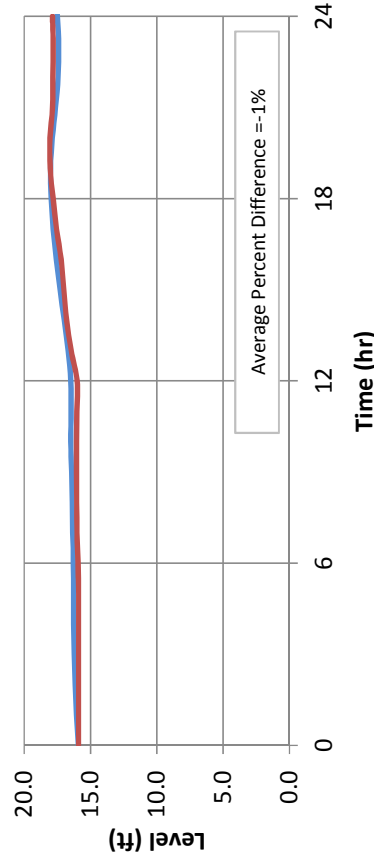
**Tank 2-2,3**



**Tank 2-1**



**Tank 2-4**



**Figure 6.3  
Hydraulic Model  
Calibration**

Water Facilities Master Plan  
West Valley Water District  
**West Valley Water District**

PRELIMINARY

January 23, 2018

**LEGEND**  
— SCADA (July 9, 2017)  
— Hydraulic Model



## CHAPTER 7 - EVALUATION AND PROPOSED IMPROVEMENTS

This section presents a summary of the domestic water system evaluation and identifies improvements needed to mitigate existing deficiencies, as well as improvements needed to expand the system and service growth.

### 7.1 OVERVIEW

The calibrated hydraulic model was used for evaluating the distribution system for capacity deficiencies during peak hour demand and during peak day demands in conjunction with fire flows. Since the hydraulic model was calibrated for extended period simulations, the analysis duration was established at 24 hours for analysis.

The criteria used for evaluating the capacity adequacy of the domestic water distribution system summarized in the System Performance and Design Criteria chapter.

### 7.2 FIRE FLOW ANALYSIS

The fire flow analysis consisted of using the peak day demand in the hydraulic model and applying hypothetical fire flows. The magnitude and duration of each fire flow was based on the governing land use type within proximity to the fire location. The criterion for fire flows was also summarized in the System Performance and Design Criteria chapter.

The hydraulic model indicates that the District's existing distribution system performed adequately during the fire flow analysis. **Figure 7.1** documents the hydraulically simulated pressure deficiencies within the existing distribution system. As discussed in the system performance and design criteria chapter, pressures within the water main must be above 20 psi to provide adequate pressure for firefighting purposes. **Figure 7.2** documents the fire flow availability based on the nearby infrastructure and hydraulically available head pressure.

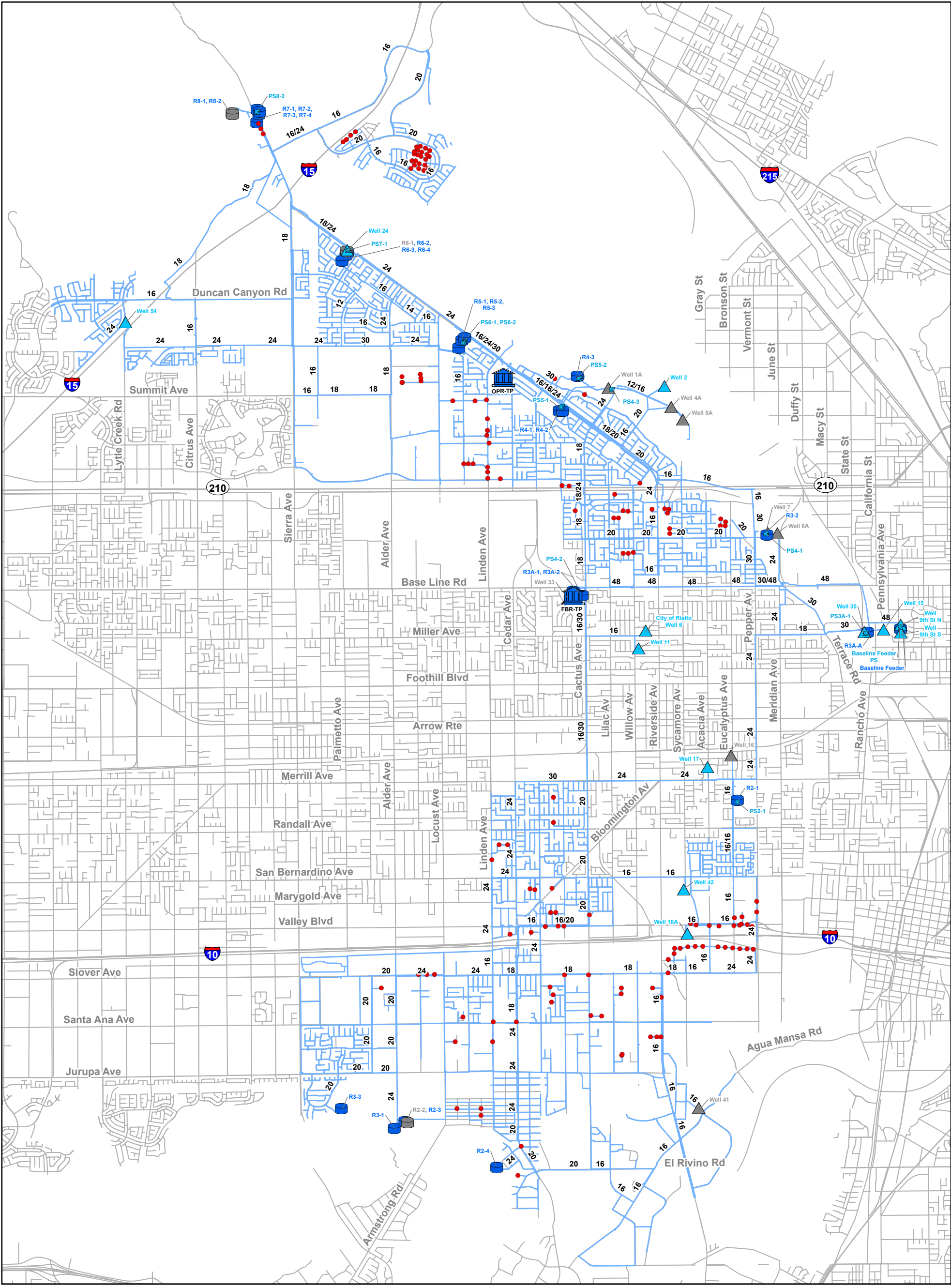
#### 7.2.1 Fire Flow Improvements

Improvements recommended to support fire flow delivery are shown with the 5-year improvements on **Figure 7.3**.

#### 7.2.2 Other Potential Improvements

It should be noted that there are areas of the system that have vulnerabilities when assessed against the Master Plan fire flow criteria. However, it was determined that some of these areas may have reduced fire flow requirements, per the California Fire Code, or other potential fire fighting capabilities, and thus, improvements are not included in this Master Plan. As future development occurs, it is recommended that a development specific fire flow analysis be completed to document any potential deficiencies and appropriate mitigation be completed.



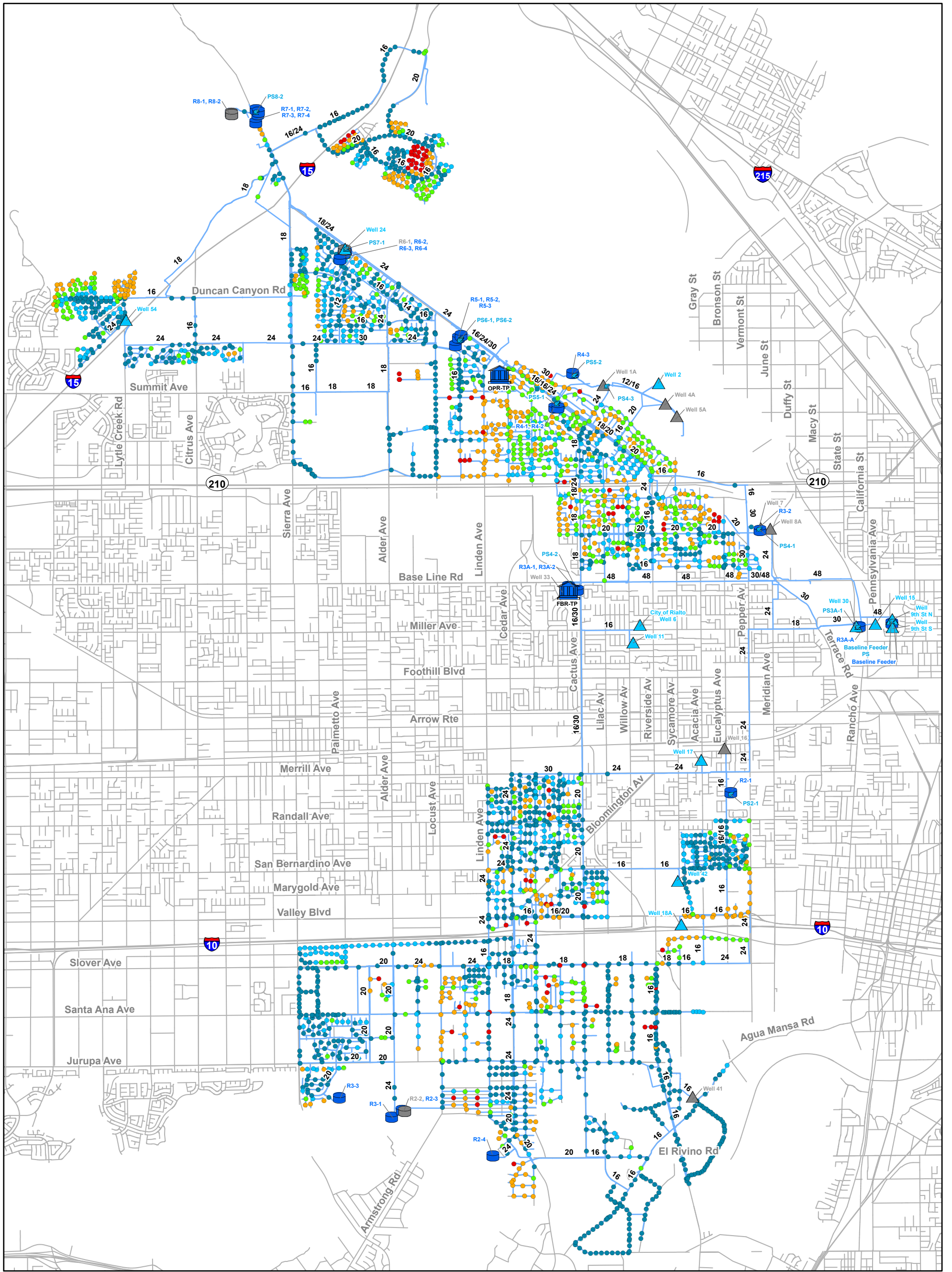


- Legend**
- Node Pressures < 20 psi
  - Existing System WTP
  - Tanks
  - Inactive Tanks
  - Active Wells
  - Inactive Wells
  - Pumps
  - Pipes
  - Street Centerlines

**PRELIMINARY**

**Figure 7.1**  
**Fire Flow Analysis**  
 Water Facilities Master Plan  
 West Valley Water District





**Legend**

- |                     |                        |                    |
|---------------------|------------------------|--------------------|
| Available Fire Flow | <b>Existing System</b> | Pumps              |
| ≤ 1,500             | WTP                    | Pipes              |
| 1,500 - 3,000       | Tanks                  | Street Centerlines |
| 3,000 - 4,000       | Inactive Tanks         |                    |
| 4,000 - 5,000       | Active Wells           |                    |
| > 5,000             | Inactive Wells         |                    |

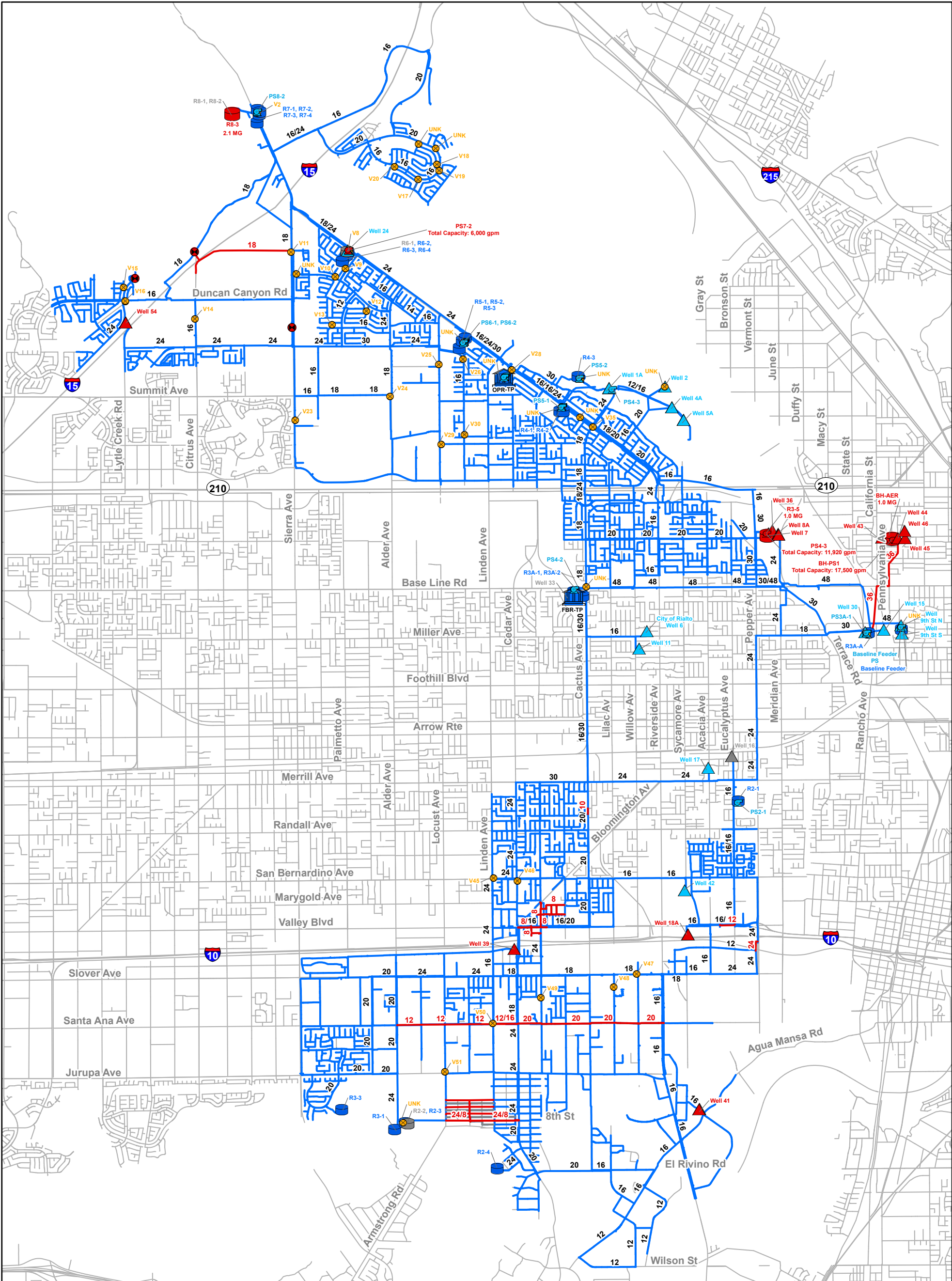
**PRELIMINARY**

**Figure 7.2  
Available Fire Flow**

Water Facilities Master Plan  
West Valley Water District







- Legend**
- |                            |                        |                    |
|----------------------------|------------------------|--------------------|
| <b>System Improvements</b> | <b>Existing System</b> | Inactive Tanks     |
| Tanks                      | WTP                    | Inactive Wells     |
| Wells                      | Tanks                  | Abandoned Pipes    |
| Pumps                      | Active Wells           | Street Centerlines |
| Valves                     | Pumps                  |                    |
| Pipes                      | Valves                 |                    |
|                            | Pipes                  |                    |

**PRELIMINARY**

**Figure 7.3**  
**5 Year Improvements**  
 Water Facilities Master Plan  
 West Valley Water District

### 7.3 LOW PRESSURES ANALYSIS

The existing domestic water distribution system was evaluated to determine the minimum pressure adequacy during peak day demand conditions. During peak day demands, the minimum pressure requirement is 40 psi, while during the peak hour demand, the minimum pressure requirement is 35 psi. The hydraulic analysis indicated the existing system is able to provide minimum pressures reasonably well. Minimum pressures during peak day demand conditions are summarized graphically on [Figure 7.4](#). Areas of low pressure are briefly described as follows:

- Zone 4, approaching Highway 210
- Zone 5, approaching Roemer WFF

### 7.4 HIGH PRESSURES ANALYSIS

The hydraulic model was also used to determine if the existing domestic water distribution system meets the District's System Performance and Design Criteria for maximum pressures. Under typical operating conditions the maximum allowable pressure in a pipeline is 130 psi, while the maximum service connection pressure is 80 psi. It is recommended that any new service connections made in areas identified as experiencing high pressure implement a pressure reducing device as part of the service connection. The hydraulic analysis indicated the existing system is able to provide minimum pressures reasonably well. Maximum pressures during peak day demand conditions are summarized graphically on [Figure 7.5](#). Areas of maximum pressure are briefly summarized as follows:

- Zone 2, southeast of Agua Mansa Road
- Zone 8, Glen Helen Parkway
- Zone 6, southwest of I15 and Duncan Canyon Rd
- Zone 6, north of the existing Zone 5 tanks

### 7.5 WATER SUPPLY REQUIREMENTS

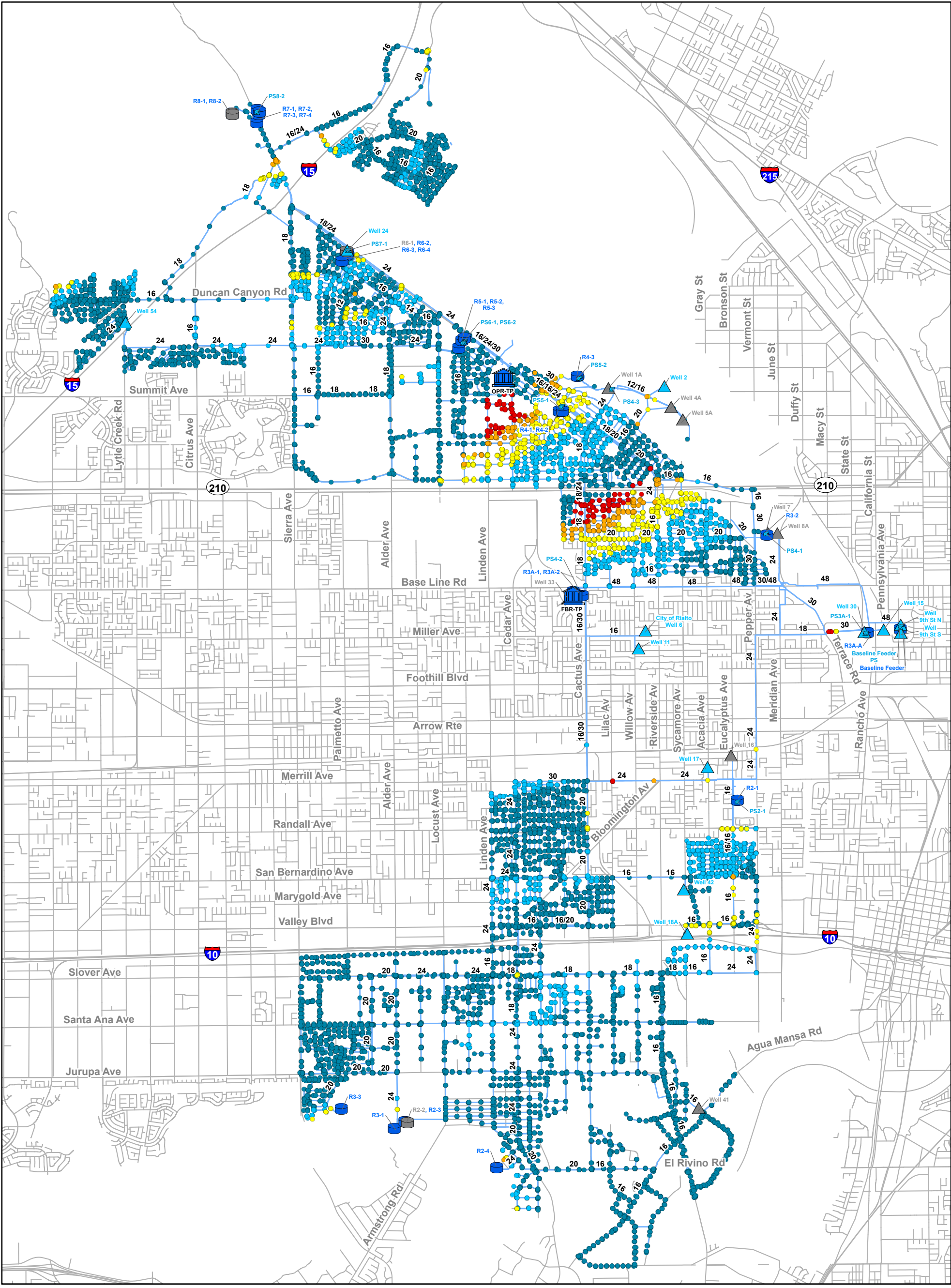
The District's existing water supply capacity is identified in this section. Additionally, this section documents the additional supply capacity recommended to meet the requirements of the 5-year and buildout development horizons.

#### 7.5.1 Water Supply Scenarios

As discussed in previous chapters the District's existing supply capacity is comprised of both groundwater and treated surface water. For planning purposes, the supply capacity analysis considered two supply alternatives, which are summarized as follows:

- **Supply Scenario 1:** This supply scenario assumes Roemer WFF is operating at maximum





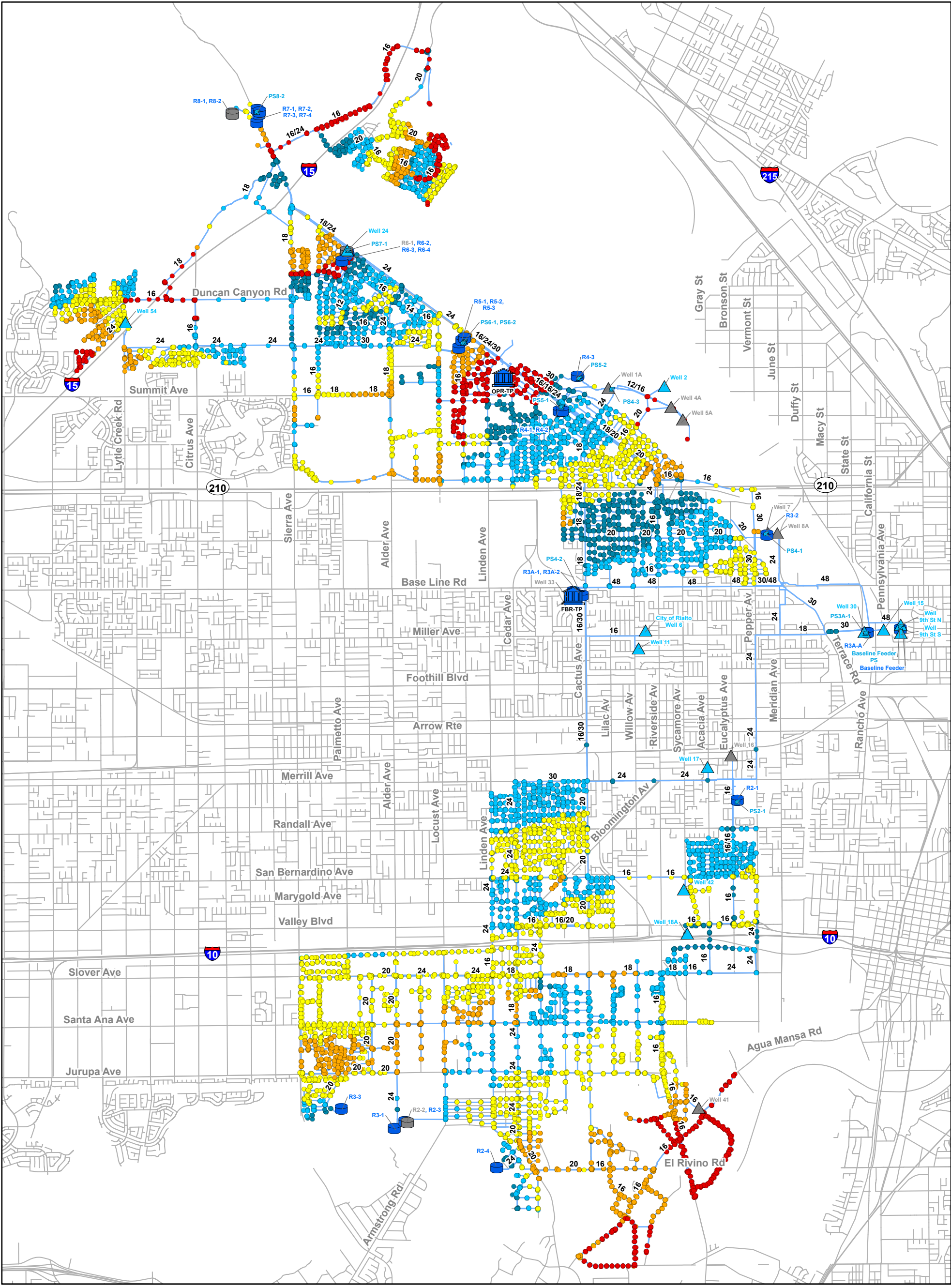
**Legend**

<b>Minimum Pressures</b>	<b>Existing System</b>	<b>Pumps</b>
● ≤ 35	WTP	— Pipes
● 35 - 40	Tanks	— Street Centerlines
● 40 - 50	Inactive Tanks	
● 50 - 65	Active Wells	
● > 65	Inactive Wells	

**PRELIMINARY**

**Figure 7.4**  
**Minimum Pressures**  
**Peak Day Demand**  
 Water Facilities Master Plan  
 West Valley Water District





**Legend**

<p>Maximum Pressures</p> <ul style="list-style-type: none"> <li>● ≤ 60</li> <li>● 60 - 80</li> <li>● 80 - 100</li> <li>● 100 - 120</li> <li>● &gt; 120</li> </ul>	<p><b>Existing System</b></p> <ul style="list-style-type: none"> <li>🏠 WTP</li> <li>🛢️ Tanks</li> <li>🛢️ Inactive Tanks</li> <li>▲ Active Wells</li> <li>▲ Inactive Wells</li> </ul>	<ul style="list-style-type: none"> <li>⚡ Pumps</li> <li>— Pipes</li> <li>— Street Centerlines</li> </ul>
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**PRELIMINARY**

**Figure 7.5**  
**Maximum Pressures**  
**Peak Day Demand**  
 Water Facilities Master Plan  
 West Valley Water District



treatment capacity, with groundwater wells providing the remaining supply requirements.

- **Supply Scenario 2:** This supply scenario assumes an interruption in SWP water availability and Roemer WFF is assumed to be treating Lytle Creek flows, which are estimated at 4,000 afy (3.6 mgd).

Thus, supply recommendations are based on the ability of the water facilities meeting each of the aforementioned supply scenarios.

### 7.5.2 System-Wide Water Supply Analysis

The system-wide water supply capacity analysis for existing and buildout conditions is summarized on [Table 7.1](#), which includes the supply requirements and available supply volumes under both Supply Scenario 1 and Supply Scenario 2. [Table 7.1](#) also documents the phased supply improvements, which includes the rehabilitation of existing wells and the construction of new wells. In addition to a system-wide supply capacity analysis.

As documented on [Table 7.1](#), the District's supply facilities are capable of meeting the existing supply requirements. Under the conservative Supply Scenario 2, the District has a supply deficiency of approximately the District has an existing supply capacity surplus the District

### 7.5.3 Pressure Zone Supply Analysis

In addition to a system-wide water supply capacity analysis, the existing pressure zones were evaluated to determine the feasibility of reducing the interzonal supply dependencies with the construction and rehabilitation of new wells. Pressure Zones 2, 3, and 3A were evaluated independently to identify supply improvements to mitigate existing supply dependencies while Pressure Zones 4-8 were evaluated together, with future pump stations planned to convey the existing and future supplies to the higher zones. The pressure zone supply analyses are summarized in the following sections.

#### 7.5.3.1 Pressure Zone 2

Under existing conditions Pressure Zone 2 relies on groundwater wells and PRVs from Pressure Zone 3 to meet existing supply requirements. As documented on [Table 7.2](#), three new wells are recommended for equipping and construction to mitigate this existing supply dependency. Additionally, one new well will be required within the buildout development horizon to meet additional demands.

#### 7.5.3.2 Pressure Zone 3

Under existing conditions Pressure Zone 3 utilizes groundwater wells and water delivered through the Meridian Turnout to meet existing supply requirements. As documented on [Table 7.3](#), three wells are recommended for rehabilitation and construction to mitigate a portion of this supply dependency. It should be noted that the potential future wells in this pressure zone are located



## Table 7.2 Pressure Zone 2 Supply Analysis

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Year	ADD <sup>1</sup>		PDD <sup>2</sup>		Supply Sources <sup>3,4,5</sup>		Groundwater Supply <sup>6</sup>		Surplus/Deficit	
	(mgd)	(mgd)	(mgd)	(mgd)	Well	Source (mgd)	Total (mgd)	Firm (mgd)	Total (mgd)	Firm (mgd)
<b>2018/19</b>	2.65	4.51			Existing W-17	0.96				
					Existing W-18A	2.08	3.04	0.96	-1.47	-3.55
<b>2019/20</b>	2.68	4.56			Equip W-41 (Treatment)	2.10	5.14	3.04	0.59	-1.51
<b>2020/21</b>	2.71	4.60			Equip W-16 (Pump Shaft)	1.40	6.54	4.44	1.94	-0.16
<b>2021/22</b>	2.73	4.65			Construct W-29A	1.40	7.94	5.84	3.30	1.20
<b>2022/23</b>	2.76	4.69					7.94	5.84	3.25	1.15
<b>2023/24</b>	2.79	4.74					7.94	5.84	3.21	1.11
<b>Buildout</b>	4.55	7.74			Construct W-51	2.90	10.84	7.94	3.10	<b>0.20</b>

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2/4/2019

Notes:

- Demands are based on the following:
  - 2018/19: Estimated existing demand
  - 2019/19-2022/23: Linear interpolation between 2018/19 and 2023/24
  - 2023/24: Additional demand based on projected 5-year growth.
- PDD = 1.7 x ADD
- Existing well capacities based on pump tests received from District staff August 2, 2017 and assume 16-hour daily operations.
- Future well capacities based on 2012 Water Master Plan and assume 16-hour daily operations.
- Firm capacity excludes largest groundwater supply.

### Table 7.3 Pressure Zone 3 Supply Analysis

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Year	ADD <sup>1</sup>		PDD <sup>2</sup>		Supply Sources <sup>3,4,5</sup>			Groundwater Supply <sup>6</sup>		Surplus/Deficit	
	(mgd)	3.87	(mgd)	6.57	Well	Source (mgd)	Total (mgd)	Firm (mgd)	Total (mgd)	Firm (mgd)	
<b>2018/19</b>					Existing W-15	1.32					
					Existing W-30	1.46					
					Existing W-42	1.56	4.34	2.78			-3.79
<b>2019/20</b>					Construct W-50	1.40					
					Rehabilitate W-39	3.80	9.54	5.74			-0.92
<b>2020/21</b>					Construct W-52	1.90	11.44	7.64			0.89
<b>2021/22</b>							11.44	7.64			0.80
<b>2022/23</b>							11.44	7.64			0.71
<b>2023/24</b>							11.44	7.64			0.62
<b>Buildout</b>					Meridian Turnout Delivery	3.63	15.07	11.27			<b>0.00</b>

2/4/2019



Notes:

- Demands are based on the following:
  - 2018/19: Estimated existing demand
  - 2019/19-2022/23: Linear interpolation between 2018/19 and 2023/24
  - 2023/24: Additional demand based on projected 5-year growth.
- PDD = 1.7 x ADD
- Existing well capacities based on pump tests received from District staff August 2, 2017 and assume 16-hour daily operations.
- Future well capacities based on 2012 Water Master Plan and assume 16-hour daily operations.
- Under buildout development PDD conditions Pressure Zone 3 will require approximately 2,500 gpm supply deliveries through the District's Meridian Turnout facility.
- Firm capacity excludes largest groundwater supply.

within the Chino Groundwater Basin. Based on the existing water rights limitations within the Chino Groundwater Basin, the District currently plans to extract its allowed amount utilizing Well 39 and no additional wells are planned for construction. Therefore, under the buildout development horizon Pressure Zone 3 will require continued supply deliveries through the Meridian Turnout.

#### **7.5.3.3 Pressure Zone 3A**

Under existing conditions Pressure Zone 3A utilizes the FBR treatment facility to meet existing supply requirements. As documented on [Table 7.4](#), under existing and buildout conditions, this facility is anticipated to be sufficient to meet the zone's supply requirements. However, it should be noted that in the event the FBR treatment facility supply is interrupted this pressure zone can receive deliveries through both the Baseline Feeder Pipeline and Pump Station 3A.

#### **7.5.3.4 Pressure Zone 4-8 (North System Pressure Zones)**

Under existing conditions Pressure Zones 4, 5, 6, 7, and 8 are supplied by both groundwater wells and the OPR treatment facility. As summarized on [Table 7.5](#), under Supply Scenario 1 the existing water supply facilities are capable of meeting the supply requirements of the pressure zones. However, under the conservative Supply Scenario 2, the available groundwater supply capacity is unable to offset the reduction in surface water available for treatment. In order to mitigate this deficiency the new wells are recommended for construction and equipping; this includes the development of the Bunker Hill well field, comprised of future wells 43, 44, 45, and 46, which is recommended for immediate design and construction. Additionally, to continue to maximize the treatment of surface water supplies, the OPR WFF 6.0 mgd expansion is planned for immediate design and construction. This capacity expansion will enable the District to take advantage of available surface water supplies and minimize groundwater pumping when possible.

### **7.5.4 Recommended Supply Improvements**

The following sections summarize the recommended supply improvements intended to mitigate existing supply deficiencies and accommodate future growth under the five-year and buildout development horizon.

#### **7.5.4.1 Five-Year Supply Improvements**

The following section summarizes the supply improvements recommended for implementation within the five-year development horizon, which are briefly on the following pages.

- **Well 16:** This well has a design capacity of 1,500 gpm and discharges into water storage reservoir 2-1. This well has existing treatment for perchlorate and additional treatment is required for nitrate before being activated.



## Table 7.4 Pressure Zone 3A Supply Analysis

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Year	ADD <sup>1</sup>		Supply Sources <sup>3,4</sup>			Groundwater Supply <sup>5</sup>		Surplus/Deficit	
	(mgd)	PDD <sup>2</sup> (mgd)	Well	Source (mgd)	Total (mgd)	Firm (mgd)	Total (mgd)	Firm (mgd)	
2018/19	1.04	1.77	FBR	2.88	2.88	2.88	1.11	1.11	
2019/20	1.05	1.78			2.88	2.88	1.10	1.10	
2020/21	1.05	1.79			2.88	2.88	1.09	1.09	
2021/22	1.06	1.80			2.88	2.88	1.08	1.08	
2022/23	1.07	1.81			2.88	2.88	1.07	1.07	
2023/24	1.07	1.82			2.88	2.88	1.06	1.06	
<b>Buildout</b>	1.11	1.89			2.88	2.88	0.99	<b>0.99</b>	

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Notes:

- Demands are based on the following:
  - 2018/19: Estimated existing demand
  - 2019/19-2022/23: Linear interpolation between 2018/19 and 2023/24
  - 2023/24: Additional demand based on projected 5-year growth.
- PDD = 1.7 x ADD
- Existing well capacities based on pump tests received from District staff August 2, 2017 and assume 16-hour daily operations.
- Future well capacities based on 2012 Water Master Plan and assume 16-hour daily operations.
- The FBR treatment facility is planned to provide supplies to Pressure Zone 3A under existing and buildout conditions. However, the District can provide supplemental supplies to this zone through the Baseline Feeder Pipeline as well as Pump Station 3A.

2/4/2019

**Table 7.5 North System Pressure Zone Supply Analysis**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Year	ADD <sup>1</sup> (mgd)	PDD <sup>2</sup> (mgd)	Groundwater Supply			Surface Water		Scenario 1 (Maximum Surface Water)		Scenario 2 (Minimum Surface Water)		
			Supply Source <sup>3,4,5</sup> Well	Capacity (mgd)	Supply Capacity <sup>6</sup> Total (mgd)	Firm (mgd)	Scenario 1 <sup>7,8</sup> (Maximum Surface Water) (mgd)	Scenario 2 <sup>9</sup> (Minimum Surface Water) (mgd)	Total (mgd)	Firm (mgd)	Total (mgd)	Firm (mgd)
2018/19	9.81	16.67	Existing W-24	0.46	7.58	4.22	12.90	2.10	3.81	0.45	-8.65	-10.35
			Existing W-54	0.88	7.58	4.22	12.90	2.10	2.54	-0.82	-8.26	-11.62
			Existing W-9th St (North)	2.88	7.58	4.22	12.90	2.10	1.27	-2.09	-9.53	-12.89
2019/20	10.55	17.94	Existing W-9th St (South)	3.36	7.58	4.22	12.90	2.10	0.00	-3.36	-10.80	-14.16
2020/21	11.30	19.21										
2021/22	12.05	20.48										
2022/23	12.79	21.75	Construct W-43	3.40	14.38	10.98	OPR WFF Expansion Online	18.90	11.53	8.13	-5.27	-8.67
			Construct W-44	3.40	14.38	10.98						
2023/24	13.54	23.02	Construct W-45	3.40	21.18	17.78						
			Construct W-46	3.40	21.18	17.78						
Buildout	19.32	32.84	Equip W-7 (Blind Flanged)	2.00					17.06	13.66	0.26	-3.14
			Equip W-8A (Treatment)	2.30								
			Equip W-22A (Treatment)	1.40								
			Construct W-34B	1.90								
			Construct W-35C	1.90								
			Equip W-36 (Treatment)	2.60	33.28	29.88	18.90	2.10	19.34	15.94	2.54	-0.86



2/4/2019

Notes:

- Demands are based on the following:
  - 2018/19: Estimated existing demand
  - 2019/19-2022/23: Linear interpolation between 2018/19 and 2023/24
  - 2023/24: Additional demand based on projected 5-year growth.
- PDD = 1.7 x ADD
- Existing well capacities based on pump tests received from District staff August 2, 2017 and assume 16-hour daily operations.
- Future well capacities based on 2012 Water Master Plan and assume 16-hour daily operations.
- For conservative supply planning purposes existing Lytle Creek groundwater basin wells (W-1, W-2, W-4A, W-5A) are considered non-reliable and excluded from the supply analysis.
- Firm capacity excludes largest groundwater supply.
- Scenario 1 assumes OPR WFF operating at maximum treatment capacity, with 1.5 mgd of treated water delivered to the City of Rialto.
- The OPR WFF treatment capacity expansion is assumed to come online in the year 2022/23.
- Scenario 2 assumes OPR WFF treating minimum reliable Lytle Creek supply of 4,000 AFY, with 1.5 mgd of treated water delivered to the City of Rialto.

- **Well 29A:** This well has a design capacity of 1,500 gpm and is planned to discharge directly into Pressure Zone 2. Treatment for perchlorate and nitrate is required before being activated.
- **Well 39:** This well has a capacity of up to 4,000 gpm and is planned to discharge directly into Pressure Zone 3. Once drilled, water quality sampling indicated nitrate exceeding regulatory limits. As such, the well was never equipped, and requires treatment and equipping prior to production.
- **Well 41:** This well has a design capacity of 2,000 gpm and directly discharges into Pressure Zone 2. Currently, this well experiences levels of perchlorate above the regulated maximum contaminant levels and wellhead treatment is required to bring online. Existing treatment vessels located at the reservoir 2-1 site are currently unused and may potentially be relocated to this well site. Feasibility of the relocation of these vessels is dependent on the site constraints. Additional land purchase may be required, should the site not accommodate the vessels. It should be noted that the rehabilitation of this well is expected to reduce the required PRV flow from Pressure Zone 3.

#### 7.5.5 Recommended Supply Improvements

- **Wells 43, 44, 45, and 46:** These wells each have a planned design capacity of 3,400 gpm and are planned as part of the Bunker Hill wellfield development. These wells are planned to discharge into a new aeration tank, which will act as a forebay to a new pump station discharging into a transmission pipeline that will ultimately connect to an existing 30-inch transmission main near the Pump Station 3A site before being conveyed to the Lord Ranch Facility.
- **Well 50:** This well has a design capacity of 1,500 gpm and is planned to discharge directly into Pressure Zone 3. Once drilled, water quality sampling indicated perchlorate exceeding regulatory limits. Treatment for perchlorate and nitrate is required before being activated.
- **Well 52:** This well has a design capacity of 2,000 gpm and is planned to discharge directly into Pressure Zone 3. Treatment for perchlorate and nitrate is required before being activated.

##### 7.5.5.1 Buildout Supply Improvements

The following section summarizes the supply improvements recommended for implementation within the buildout development horizon, which are briefly summarized as follows:

- **Well 7:** This well has a design capacity of 2,100 gpm and is planned to discharge directly into water storage reservoir 3-2. According to District records this well is currently blind flanged.

- **Well 8A:** This well has a design capacity of 2,400 gpm and discharges directly into water storage reservoir 3-2. Currently this well experiences high levels of arsenic and wellhead treatment is required prior to activation.
- **Well 22A:** This well has a design capacity of 1,500 gpm and discharges directly into Pressure Zone 4. Currently, this well experiences high levels of nitrate and wellhead treatment is recommended to bring online. This well will require further study to determine the best methodology to mitigate the ongoing nitrate contamination.
- **Well 34B:** This well has a planned design capacity of 2,000 gpm and discharges directly into Pressure Zone 4. This well is replacing a previously destroyed well and will require re-drilling and equipping. It is also assumed that this well will require wellhead treatment for arsenic levels required prior to activation.
- **Well 35C:** This well has a planned design capacity of 2,000 gpm and discharges directly into Pressure Zone 4. A casing currently exists at this well location and a new study is recommended to confirm the construction and water quality requirements of this well. It is also assumed that this well will require wellhead treatment for arsenic levels required prior to activation.
- **Well 36:** This well has a design capacity of 2,700 gpm and discharges directly into water storage reservoir 3-2. Currently, this well experiences high levels of arsenic and wellhead treatment is required prior to activation.
- **Well 51:** This well has a design capacity of 2,000 gpm and is planned to discharge directly into Pressure Zone 2. The specific location of this well has not been determined and well site investigations should include a water quality study to determine the need for treatment. It should be noted that the construction of this well will reduce the required PRV flow from Pressure Zone 3.

### 7.5.6 Water Supply Treatment Evaluation

This section documents the groundwater and surface water treatment options for the District, as recommended by Kleinfelder.

#### 7.5.6.1 Groundwater Treatment

**Table 7.6** documents the existing conditions of the District's groundwater wells. There are currently 12 active production wells. Some of the production wells are contaminated with perchlorate, nitrate, arsenic, or have issues with air entrapment producing milky water and inducing customer complaints. The District has been proactive in its efforts to install wellhead treatment to maintain the operational status of these wells, and provide high quality drinking water.

**Table 7.6 Well Production Capacity and Water Quality Issues**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Well	Zone	Basin	Location	Five Year Projections, 2022				Ultimate Buildout, 2055				Current Condition of Use	Water Quality Issues
				Pump Capacity (gpm)	Product. Capacity 16h/d Ops (mgd)	Severe Drought Capacity (mgd)	Water Demand (afy)	Pump Capacity 2055 (gpm)	Product. Capacity 16h/d Ops (mgd)	Severe Drought Capacity 2055 (mgd)	Water Demand (afy)		
<b>Lytle Creek Basin</b>													
W-7	3, 4	LC	6871 Martin Road, San Bernardino	2,100	2.0	1.0		2,100	2.0	1.0		Not in operation, Blind flanged	
W-8A	3, 4	LC	6871 Martin Road, San Bernardino	2,400	2.3	0.9		2,400	2.3	0.9		Not currently used, arsenic issue	Low level arsenic
W-36	3,4	LC	20600 Walnut Avenue, San Bernardino					2,700	2.6	0.9		Not currently used	Arsenic removal required
W-1A	4	LC	19523 Country Club Drive, Rialto					760	0.7	0.6		Not currently used due to declining water level	
W-2	4	LC	19973 Country Club Drive, Rialto	2,800	2.7	1.6		2,800	2.7	1.6		Has arsenic treatment, coagulation line	Arsenic
W-4A	4	LC	5914 N. Sycamore Avenue, Rialto					2,600	2.5	0.9		Not currently used due to declining water level	
W-5A	4	LC	5914 N. Sycamore Avenue, Rialto					2,200	2.1	1.0		Not currently used due to declining water level	
W-34B	4	LC	19655 Country Club Drive, Rialto (Future)					2,000	1.9	0.8		Not constructed, replacement for Well 34B	Assumed As removal
W-35C	4	LC	5855 N. Sycamore Avenue, Rialto (Future)					2,000	1.9	0.8		Not constructed, replacement for capped Well 35C	Assumed As removal
			TOTAL LC Current	7,300	7.0	3.5		12,860	12.3	6.0			
			TOTAL LC FUTURE	0	0.0	0.0		6,700	6.4	2.5			
			<b>TOTAL LC Basin</b>	<b>7,300</b>	<b>7.0</b>	<b>3.5</b>		<b>19,560</b>	<b>18.7</b>	<b>8.5</b>			
<b>Rialto-Colton Basin</b>													
W-16	2	R	296 S. Eucalyptus Avenue, Rialto	1,500	1.4	0.8		1,500	1.4	0.8		Current IX for perchlorate, Not used-pump shaft	Perchlorate, Now nitrate
W-17	2	R	404 S. Acacia Avenue, Rialto	1,250	1.2	0.6		1,250	1.2	0.6		Current IX for perchlorate, Operational	Perchlorate
W-49	2	R	Eucalyptus Avenue, Rialto (Future)					1,500	1.4	0.7		Not constructed	
W-11	3A	R	238 W. Victoria Street, Rialto	1,800	1.7	0.9		1,800	1.7	0.9		Current perchlorate FBR, runs when Well 6 is off	
W-33	3A	R	855 W. Baseline Road, Rialto	2,600	2.5	1.3		2,600	2.5	1.3		Not in use, FBR has no capacity, Need to add IX	Perchlorate
W-22A	4	R	5700 N. Riverside Avenue, Rialto (Future)					1,500	1.4	0.7		Well constructed & deactivated, needs treatment	Nitrate >MCL
W-23A	6	R	4334 N. Riverside Avenue, Rialto	200	0.2	0.0		200	0.2	0.0		Not regularly used. Serve as standby for zone 3	
W-24	6	R	4334 N. Riverside Avenue, Rialto	600	0.6	0.3		600	0.6	0.3		OK, Operational	



**Table 7.6 Well Production Capacity and Water Quality Issues**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Well	Zone	Basin	Location	Five Year Projections, 2022			Ultimate Buildout, 2055			Current Condition of Use	Water Quality Issues	
				Pump Capacity (gpm)	Product. Capacity 16h/d Ops (mgd)	Severe Drought Capacity (mgd)	Water Demand (afy)	Pump Capacity 2055 (gpm)	Product. Capacity 16h/d Ops (mgd)			Severe Drought Capacity 2055 (mgd)
W-54	6	R	Duncan Canyon Road, Fontana	1,000	1.0	0.6	0.6	1,000	1.0	0.6	Air in water, customer complaints, Operational	
			TOTAL RC Current	8,950	8.6	4.4	4.4	8,950	8.6	4.4		
			TOTAL RC FUTURE	0	0.0	0.0	0.0	3,000	2.8	1.4		
			<b>TOTAL RC Basin</b>	<b>8,950</b>	<b>8.6</b>	<b>4.4</b>	<b>4.4</b>	<b>11,950</b>	<b>11.4</b>	<b>5.8</b>		
<b>Bunker Hill Basin</b>												
W-15	3, 3A, 2	BH	1915 W. 9th Street, San Bernardino	2,700	2.6	0.6	0.6	2,700	2.6	0.6	OK, Operational	
W-30	3, 3A, 2	BH	2015 W. 9th Street, San Bernardino	3,100	3.0	3.0	3.0	3,100	3.0	3.0	OK, Operational	
W-43	3, 3A, 4	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
W-44	3, 3A, 4	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
W-45	3, 3A, 4	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
W-46	3A	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
W-47	3A	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
W-48	3A	BH	Along Baseline Feeder (Future)		0.0		3.4	3,500	3.4	3.4	Not constructed, Options: BH or through Baseline Feeder	
			TOTAL BH Current	5,800	5.6	5.6	5.6	5,800	5.6	3.6		
			TOTAL BH FUTURE	0	0.0	0.0	20.4	21,000	20.4	20.4		
			<b>TOTAL BH Basin</b>	<b>5,800</b>	<b>5.6</b>	<b>5.6</b>	<b>24.0</b>	<b>26,800</b>	<b>26.0</b>	<b>24.0</b>		
<b>North Riverside Basin</b>												
W-18A	2	NR	1783 S. Sycamore Avenue, Colton	2,700	2.6	1.3	1.3	2,700	2.6	1.3	Current IX perchlorate	Perchlorate, Now nitrate, Oil
W-41	2	NR	3353 S. Industrial, Rialto	2,200	2.1	1.1	1.1	2,200	2.1	1.1	Currently off	Now perchlorate
W-42	3	NR	295 E. San Bernardino, Rialto	2,200	2.1	1.1	1.1	2,200	2.1	1.1	Current IX for perchlorate. OK, Operational	Perchlorate, Now nitrate = 6ppm
W-19A	2	NR	TBD (Future)		0.0		0.7	2,100	1.5	0.7	Not constructed	
W-29A	2	NR	180 W. Slover Avenue, Rialto (Future)		0.0		0.5	1,500	1.0	0.5	Not constructed	
W-38	2	NR	TBD (Future)		0.0		0.7	1,900	1.4	0.7	Not constructed	
W-40	2	NR	157 W. Resource Drive, Rialto (Future)		0.0		0.5	1,500	1.0	0.5	Drilled but not equipped	
W-53	2	NR	TBD (Future)		0.0		0.9	2,100	1.7	0.9	Not constructed	

**Table 7.6 Well Production Capacity and Water Quality Issues**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Well	Zone	Basin	Location	Five Year Projections, 2022			Ultimate Buildout, 2055			Current Condition of Use	Water Quality Issues
				Pump Capacity (gpm)	Product. Capacity 16h/d Ops (mgd)	Severe Drought Capacity (mgd)	Water Demand (afy)	Pump Capacity 2055 (gpm)	Product. Capacity 16h/d Ops (mgd)		
W-51	2	NR	TBD (Future)	0.0	0.0	0.0	3,000	2.2	1.1	Not constructed	
W-52	3	NR	TBD (Future)	0.0	0.0	0.0	2,000	2.2	1.1	Not constructed	
W-50	3	NR	Willow Ave. and San Bernardino Ave. (Future)	0.0	0.0	0.0	1,500	1.0	0.5	Not constructed	
			TOTAL NR Current	7,100	6.8	3.4	7,100	6.8	3.4		
			TOTAL NR FUTURE	0	0.0	0.0	15,600	12.0	6.0		
			<b>TOTAL NR Basin</b>	<b>7,100</b>	<b>6.8</b>	<b>3.4</b>	<b>22,700</b>	<b>18.8</b>	<b>9.4</b>		
<b>Chino Basin</b>											
W-39	3	C	10272 Cedar Place, San Bernardino Co (Future)	0.0	0.0	0.0	4,000	3.8	2.0	High levels of nitrate Drilled but not equipped	
			TOTAL C Current	0	0.0	0.0	0	0.0	0.0		
			TOTAL C FUTURE	0	0.0	0.0	4,000	3.8	2.0		
			<b>TOTAL C Basin</b>	<b>0</b>	<b>0.0</b>	<b>0.0</b>	<b>4,000</b>	<b>3.8</b>	<b>2.0</b>		
			TOTAL Ground Water Current	29,150	28.0	16.8	34,710	33.3	17.3		
			TOTAL Ground Water FUTURE	0	0.0	0.0	50,300	45.4	32.3		
			<b>TOTAL Ground Water</b>	<b>29,150</b>	<b>28.0</b>	<b>16.8</b>	<b>85,010</b>	<b>78.7</b>	<b>49.6</b>		

Notes:

1. Table prepared by Kleinfelder, Inc staff February 2018.
2. Annual average and maximum water demand for intermediate water supply conditions by year 2022 can be satisfied by utilizing all existing wells. This assumes all currently running wells shall be operable which will require regular and preventive maintenance.
3. To satisfy intermediate water supply demand, capital improvements by implementing wellhead treatments will be required to bring the currently constructed but not running wells in operation by 2022
4. Capacity of the current and the identified additional ground water wells has potential for production of 84.8 MGD which exceeds the average and daily maximum demands of 30.55 MG and 58.68 MGD, respectively.
5. Under severe drought conditions, Baseline Feeder and/or SWP shall be utilized to provide supplemental water supply during peak day demands for intermediate condition of 2022 and for built out conditions of 2055.
6. The OPR WFF with its current capacity of 14.4 MG provides supplemental water supply to the proposed wellhead supply for the intermediate water supply conditions through 2022. The planned 6 MGD expansion shall be realized to satisfy ultimate buildout water demand

The District owns seven non-operating wells that have been inactivated due to mechanical failure of the equipment, or due to contamination such as perchlorate, nitrate, arsenic. For example, W-16, which already has an ionic exchange; wellhead treatment for perchlorates, has a malfunction of the shaft of the pump, W-8A is contaminated with arsenic; and W-33 and W-41 have perchlorate levels that exceed the current MCL. Each of these wells will require treatment or rehabilitation prior to activation.

**7.5.6.2 Surface Water Treatment**

The Roemer WFF uses raw water from Lytle Creek, and supplemental water from the SWP to treat and deliver high quality drinking water to the existing District customers. The Roemer WFF is operated up to the design capacity and, with regular and planned maintenance, is producing drinking water in compliance with current water quality standards, including TOC reduction to above regulated 35 percent.

**7.6 STORAGE ANALYSIS**

The section documents the District’s existing domestic water storage capacity. Additionally, this section identifies the existing and future storage requirements to meet the storage capacity criteria by pressure zone.

**7.6.1 Storage Requirements**

The following sections summarize the storage requirements under existing, 5-year, and buildout development conditions. The storage requirements for each development condition are calculated based on criteria discussed in the System Performance and Design Criteria chapter and are summarized on **Table 7.7**.

**7.6.1.1 Existing Development**

Existing storage requirements were identified for each pressure zone and are summarized in **Table 7.7**. The table lists the existing domestic water demands and operational, pumping, and fire storage for each pressure zone. As summarized on this table the total required storage for existing domestic water demands is 51.8 MG. The current usable storage capacity is 71.86 MG. There are two inactive reservoirs: R6-1 (0.25 MG) and R2-2 (0.5 MG). Reservoir R2-2 is tar lined and R6-6 needs interior recoating. The cost to rehabilitate these two older reservoirs is quite substantial compared to their limited storage capacity.

**7.6.1.2 5-Year Development**

The storage requirements due to 5-year development were identified based on the planned five year growth and are summarized by pressure zone on **Table 7.7**. The table lists the additional domestic water demands due to 5-year development and identifies the operational, pumping, and fire storage for each pressure zone. As summarized on this table the total required storage for

**Table 7.7 Storage Requirements**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Pressure Zone	Water Demands		Water Storage Requirements			
	Average Day Demand <sup>1</sup> (mgd)	Peak Day Demand <sup>2</sup> (mgd)	Operational at 100% (MG)	Fire Protection <sup>3</sup> (MG)	Pumping Storage <sup>4,5</sup> (MG)	Total, By Pressure Zone (MG)
<b>Existing Storage Requirements</b>						
<b>South System Pressure Zones</b>						
2	2.65	4.51	4.51	0.96	-	5.47
3	3.87	6.57	6.57	0.96	-	7.53
3A	1.04	1.77	1.77	0.54	-	2.31
<b>Subtotal</b>	<b>7.56</b>	<b>12.85</b>	<b>12.85</b>	<b>2.46</b>	<b>0.00</b>	<b>15.31</b>
<b>North System Pressure Zones</b>						
4	1.96	3.32	3.32	0.54	7.85	11.72
5	1.98	3.36	3.36	0.54	5.87	9.78
6	3.18	5.40	5.40	0.96	2.70	9.06
7	2.46	4.18	4.18	0.54	0.24	4.96
8	0.24	0.41	0.41	0.54	-	0.95
<b>Subtotal</b>	<b>9.81</b>	<b>16.67</b>	<b>16.67</b>	<b>3.12</b>	<b>16.66</b>	<b>36.46</b>
<b>Existing Storage Requirements</b>						
	<b>17.37</b>	<b>29.52</b>	<b>29.52</b>	<b>5.58</b>	<b>16.66</b>	<b>51.77</b>
<b>New Storage Requirements (Near-Term 5-Year Planning)</b>						
<b>South System Pressure Zones</b>						
2	0.13	0.22	0.22	0.96	-	1.18
3	0.27	0.45	0.45	0.96	-	1.41
3A	0.03	0.06	0.06	0.54	-	0.60
<b>Subtotal</b>	<b>0.43</b>	<b>0.73</b>	<b>0.73</b>	<b>2.46</b>	<b>0.00</b>	<b>3.19</b>
<b>North System Pressure Zones</b>						
4	0.04	0.07	0.07	0.54	3.69	4.30
5	0.66	1.12	1.12	0.54	3.03	4.69
6	1.19	2.02	2.02	0.96	1.84	4.83
7	1.59	2.70	2.70	0.54	0.26	3.49
8	0.26	0.44	0.44	0.54	-	0.98
<b>Subtotal</b>	<b>3.73</b>	<b>6.34</b>	<b>6.34</b>	<b>3.12</b>	<b>8.82</b>	<b>18.29</b>
<b>New Storage Requirements</b>						
	<b>4.16</b>	<b>7.07</b>	<b>7.07</b>	<b>5.58</b>	<b>8.82</b>	<b>21.48</b>

**Table 7.7 Storage Requirements**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Pressure Zone	Water Demands		Water Storage Requirements			
	Average Day Demand <sup>1</sup> (mgd)	Peak Day Demand <sup>2</sup> (mgd)	Operational at 100% (MG)	Fire Protection <sup>3</sup> (MG)	Pumping Storage <sup>4,5</sup> (MG)	Total, By Pressure Zone (MG)
<b>New Storage Requirements (Year 6 through Buildout Planning)</b>						
<b>South System Pressure Zones</b>						
2	1.77	3.00	3.00	0.96	-	3.96
3	2.50	4.26	4.26	0.96	-	5.22
3A	0.04	0.07	0.07	0.54	-	0.61
<b>Subtotal</b>	<b>4.31</b>	<b>7.32</b>	<b>7.32</b>	<b>2.46</b>	<b>0.00</b>	<b>9.78</b>
<b>North System Pressure Zones</b>						
4	0.27	0.46	0.46	0.54	5.51	6.51
5	0.19	0.33	0.33	0.54	5.31	6.18
6	2.44	4.16	4.16	0.96	2.87	7.98
7	2.47	4.19	4.19	0.54	0.40	5.14
8	0.40	0.68	0.68	0.54	-	1.22
<b>Subtotal</b>	<b>5.78</b>	<b>9.83</b>	<b>9.83</b>	<b>3.12</b>	<b>14.09</b>	<b>27.04</b>
<b>New Storage Requirements</b>						
	<b>10.09</b>	<b>17.15</b>	<b>17.15</b>	<b>5.58</b>	<b>14.09</b>	<b>36.82</b>
<b>Total Storage Requirements at Buildout</b>						
<b>South System Pressure Zones</b>						
2	4.55	7.74	7.74	0.96	-	8.70
3	6.63	11.28	11.28	0.96	-	12.24
3A	1.11	1.89	1.89	0.54	-	2.43
<b>Subtotal</b>	<b>12.30</b>	<b>20.90</b>	<b>20.90</b>	<b>2.46</b>	<b>0.00</b>	<b>23.36</b>
<b>North System Pressure Zones</b>						
4	2.27	3.85	3.85	0.54	17.05	17.44
5	2.83	4.81	4.81	0.54	14.22	15.57
6	6.81	11.58	11.58	0.96	7.41	19.95
7	6.51	11.07	11.07	0.54	0.90	12.51
8	0.90	1.53	1.53	0.54	-	2.07
<b>Subtotal</b>	<b>19.32</b>	<b>32.84</b>	<b>32.84</b>	<b>3.12</b>	<b>39.58</b>	<b>67.54</b>
<b>Total Storage Requirements</b>						
	<b>31.62</b>	<b>53.75</b>	<b>53.75</b>	<b>5.58</b>	<b>39.58</b>	<b>90.91</b>

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Notes:

2/6/2019

- Existing average day demands based on 2014 production less 10%, where the demand distribution by pressure zone is based on 2016 water billing records.
- Peak Day Demand = 1.7 x Average Day Demand
- Fire Protection requirement represents largest fire requirement for each zone, based on account types listed in water billing records
- Zones 4-7 include a pumping storage capacity which is equal to 1-day storage of ADD for the higher zones.
- The pumping storage shown in this table is the maximum pumping storage required and does not take into account the 4.0 MG of pumping storage available at the OPR WFF during emergency conditions.



5-year domestic water demands is 21.5 MG, which excludes the demands due to existing development.

### **7.6.1.3 Buildout Development Storage Requirements**

The storage requirements due to buildout development of the District service area are summarized by pressure zone on [Table 7.7](#). The table lists the additional domestic water demands due to buildout development and identifies the operational, pumping, and fire storage for each pressure zone. The table also lists the total required storage for buildout domestic water demands at 36.8 MG, which excludes the demands due to existing and 5-year development.

## **7.6.2 Storage Analysis and Recommended New Storage Facilities**

The existing and future storage requirements, shown on [Table 7.7](#), were compared with existing District storage facilities in each pressure zone and the required storage facility improvements for the 5-year ([Table 7.8](#)) and Buildout ([Table 7.9](#)) development horizons were identified; these tables list existing storage facilities for each zone, identifies existing storage capacity deficiencies, and identifies future storage capacity requirements to meet the needs from future growth.

### **7.6.2.1 5-year Development Storage Analysis**

Based on the storage analysis shown on [Table 7.8](#), the majority of the existing pressures zones have sufficient storage capacity to meet existing and five-five year requirements. The storage improvements recommended for construction within the five-year development horizon include the replacement of the existing Pressure Zone 8 storage reservoirs and the construction of a planned aeration reservoir, which are briefly summarized as follows:

**Pressure Zone 8:** In order to meet the storage capacity requirements due to the 5-year development within this pressure zone, an additional 0.5 MG of storage capacity is required. However, in order provide additional capacity for buildout development within the pressure zone a total capacity of 2.1 MG is recommended, which will provide surplus storage capacity to meet growing storage requirements as development continues beyond the 5-year development planning horizon. This storage volume also accounts for the demolition of the existing Zone 8 storage reservoirs.

- **Lord Ranch Facility:** The current designs for the Lord Ranch Facility include the construction of one new aeration reservoir. This reservoir is not intended to float on the District's distribution system and will serve as a forebay to the Lord Ranch Facility pump station expansion.

The proposed storage reservoir improvements for the 5-year development horizon are included on [Table 7.10](#) and graphically shown on [Figure 7.3](#), and described as follows:

- **Z8-R8-3:** Replace the existing 0.10 MG and 0.41 MG Zone 8 water storage reservoirs with a 2.1 MG storage reservoir at the existing Zone 8 Tank site.



**Table 7.9 Storage Capacity Analysis - Buildout**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Pressure Zone	Demands			Operational + Emergency Storage		Pumping Storage <sup>1,2</sup>		Fire Protection <sup>3</sup>	Total Existing and Future <sup>4</sup>	Existing Storage Reservoirs								Proposed New Storage Reservoirs								Storage Balance for Existing and Buildout Demands			
	Existing Average Day Demand (MGD)	Future Average Day Demand (MGD)	Future Peak Day Demand (MGD)	Existing (MG)	Future (MG)	Existing (MG)	Future (MG)			Zone 2 (MG)	Zone 3A (MG)	Zone 4 (MG)	Zone 5 (MG)	Zone 6 (MG)	Zone 7 (MG)	Zone 8 (MG)	Total (MG)	Zone 2 (MG)	Zone 3A (MG)	Zone 4 (MG)	Zone 5 (MG)	Zone 6 (MG)	Zone 7 (MG)	Zone 8 (MG)	Total (MG)		Storage Balance for Existing and Buildout Demands (MG)		
																												Zone 2 (MG)	Zone 3A (MG)
<b>South System</b>																													
Pressure Zone 2	2.65	4.51	1.90	3.23	4.51	3.23	0.00	0.00	8.70	11.00	11.00	2.30	11.00	0.00	11.00	2.30	11.00	0.00	11.00	0.00	11.00	2.30	11.00	0.00	11.00	2.30	11.00	2.30	
Pressure Zone 3	3.87	6.57	2.77	4.71	6.57	4.71	0.00	0.00	12.24	9.00	9.00	-3.24	9.00	3.25	3.25	-3.24	9.00	3.25	3.25	0.01	3.25	0.01	3.25	0.01	3.25	0.01	3.25	0.01	
Pressure Zone 3A	1.04	1.77	0.07	0.12	1.77	0.12	0.00	0.00	2.43	6.00	6.00	3.57	6.00	0.00	6.00	3.57	6.00	0.00	6.00	0.00	6.00	3.57	6.00	0.00	6.00	3.57	6.00	3.57	
<b>Subtotal</b>	7.56	12.85	4.74	8.06	12.85	8.06	0.00	0.00	23.36	26.00	26.00	2.64	26.00	3.25	3.25	2.64	26.00	3.25	3.25	5.89	3.25	29.25	5.89	3.25	29.25	5.89	3.25	29.25	5.89
<b>North System</b>																													
Pressure Zone 4	1.96	3.32	0.31	0.53	3.32	0.53	7.85	9.20	17.44	11.00	11.00	-6.44	11.00	7.00	7.00	-6.44	11.00	7.00	7.00	0.56	7.00	18.00	0.56	7.00	18.00	0.56	7.00	18.00	0.56
Pressure Zone 5	1.98	3.36	0.85	1.45	3.36	1.45	5.87	8.35	15.57	13.00	13.00	-2.57	13.00	2.60	2.60	-2.57	13.00	2.60	2.60	0.03	2.60	15.60	0.03	2.60	15.60	0.03	2.60	15.60	0.03
Pressure Zone 6	3.18	5.40	3.63	6.18	5.40	6.18	2.70	4.71	19.95	11.00	11.00	-8.95	11.00	9.00	9.00	-8.95	11.00	9.00	9.00	0.05	9.00	20.00	0.05	9.00	20.00	0.05	9.00	20.00	0.05
Pressure Zone 7	2.46	4.18	4.05	6.89	4.18	6.89	0.24	0.66	12.51	9.15	9.15	-3.36	9.15	3.40	3.40	-3.36	9.15	3.40	3.40	0.04	3.40	12.55	0.04	3.40	12.55	0.04	3.40	12.55	0.04
Pressure Zone 8	0.24	0.41	0.66	1.12	0.41	1.12	0.00	0.00	2.07	0.51	0.51	-1.56	0.51	2.10	2.10	-1.56	0.51	2.10	2.10	0.03	2.10	2.10	0.03	2.10	2.10	0.03	2.10	2.10	0.03
<b>Subtotal</b>	9.81	16.67	9.51	16.17	16.67	16.17	16.66	22.92	67.54	44.66	44.66	-22.88	44.66	24.10	24.10	-22.88	44.66	24.10	24.10	1.22	24.10	68.76	1.22	24.10	68.76	1.22	24.10	68.76	1.22
<b>Total</b>	<b>17.37</b>	<b>29.52</b>	<b>14.25</b>	<b>24.22</b>	<b>29.52</b>	<b>24.22</b>	<b>16.66</b>	<b>22.92</b>	<b>90.91</b>	<b>70.66</b>	<b>70.66</b>	<b>-20.25</b>	<b>70.66</b>	<b>27.35</b>	<b>27.35</b>	<b>-20.25</b>	<b>70.66</b>	<b>27.35</b>	<b>27.35</b>	<b>7.10</b>	<b>27.35</b>	<b>98.01</b>	<b>7.10</b>	<b>27.35</b>	<b>98.01</b>	<b>7.10</b>	<b>27.35</b>	<b>98.01</b>	<b>7.10</b>

1/25/2019



Notes:

1. Pumping Storage defined as 100% Average Day Demand (ADD) for supply dependent pumping zone.
2. The pumping storage shown in this column is the maximum pumping storage required and does not take into account the 4.0 MG of pumping storage available and the OPR WFF.
3. Fire storage requirement is the greatest fire flow volume of existing and future customers for each pressure zone.
4. The total pumping requirement for Zone 4 and Zone 5 reflects a 4.0 MG reduction in pumping storage due to supply available at the OPR WFF under emergency operational conditions.

**Table 7.10 Proposed Storage Reservoirs**Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Tank ID	Pressure Zone	Volume (MG)	Bottom Elevation (ft)
R3-4	3	3.25	1,260
LR-R3-5	3	1.00	1,156
R4-4	4	7.00	1,500
R5-4	5	2.60	1,638
R6-5	6	6.00	1,860
R6-6	6	3.00	1,860
R7-5	7	3.40	2,120
R8-3	8	2.10	2,363
R-BH-AER	-	1.00	2,345
<b>Total</b>		<b>29.35</b>	



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1/11/2019

- **LR-R3-5:** Construct a new 1.0 MG water storage reservoir at the existing Lord Ranch Facility.

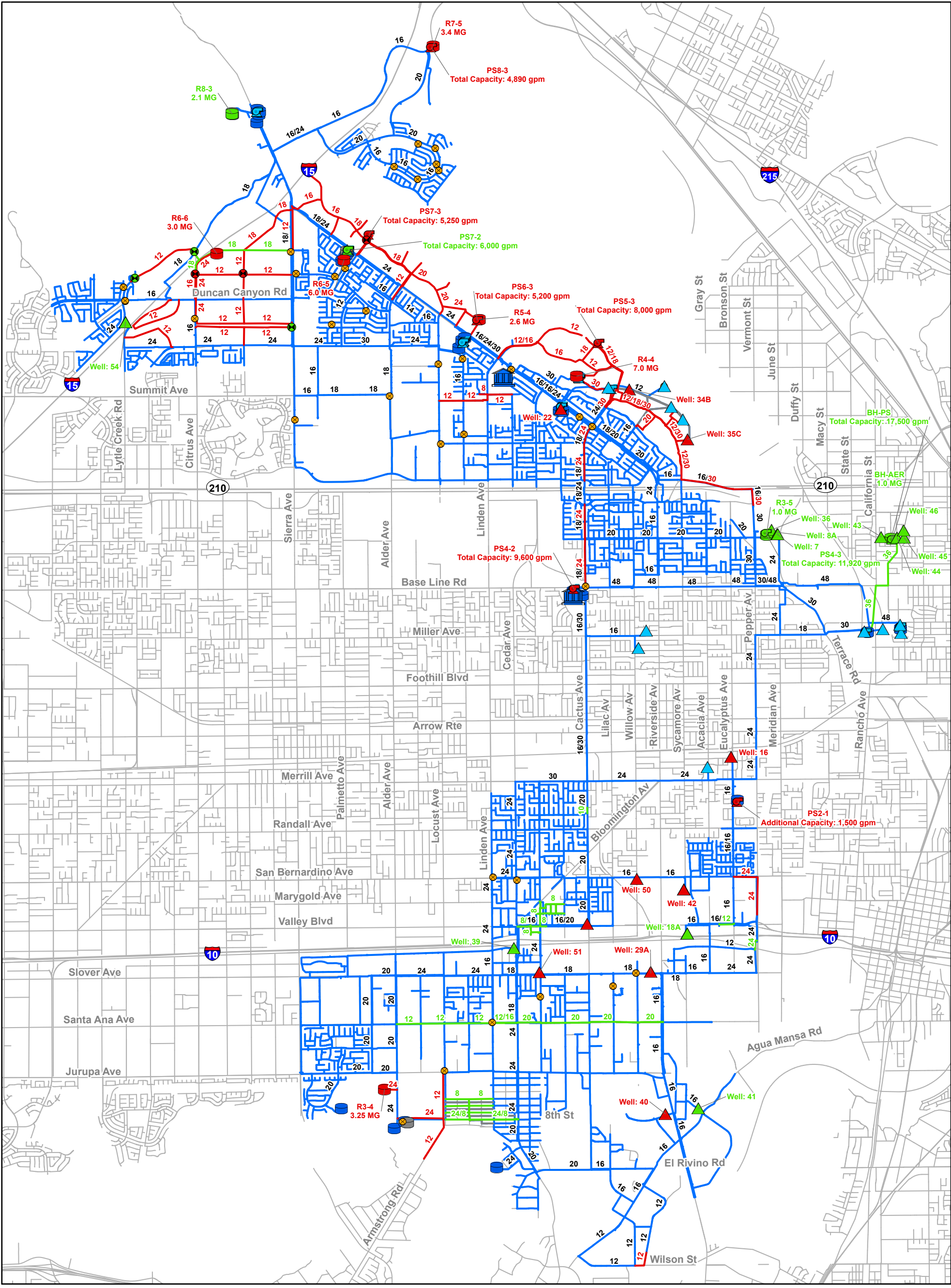
#### 7.6.2.2 Buildout Development Storage Analysis

Based on the storage analysis shown on [Table 7.9](#), the existing storage capacity of multiple pressure zones is unable to meet the storage requirements at buildout of the District service area. In order to mitigate these storage deficiencies multiple storage reservoirs are recommended, as summarized on [Table 7.10](#) and shown graphically on [Figure 7.6](#).

These storage deficiencies and recommended improvements are also briefly summarized below:

- **Pressure Zone 2:** Pressure Zone 2 is expected to have surplus storage capacity at buildout demands, and no improvements are recommended.
- **Pressure Zone 3:** In order to meet the storage capacity requirements at the buildout of the District service area, an additional 3.25 MG of storage capacity is recommended. This additional capacity is planned to be provided by the construction of one new storage reservoir.
- **Pressure Zone 3A:** Pressure Zone 3A is expected to have surplus storage capacity at buildout demands and no improvements are recommended.
- **Pressure Zone 4:** In order to meet the storage capacity requirements at the buildout of the District service area, an additional 7.0 MG of storage capacity is recommended. This additional capacity is planned to be provided by the construction of one new storage reservoir.
- **Pressure Zone 5:** In order to meet the storage capacity requirements at the buildout of the District service area, an additional 2.6 MG of storage capacity is recommended. This additional capacity is planned to be provided by the construction of one new storage reservoir.
- **Pressure Zone 6:** In order to meet the storage capacity requirements at the buildout of the District service area an additional 9.0 MG of storage capacity is recommended. This additional capacity is planned to be provided by the construction of two new storage reservoirs.
- **Pressure Zone 7:** In order to meet the storage capacity requirements at the buildout of the District service area, an additional 3.4 MG of storage capacity is recommended. This additional capacity is planned to be provided by the construction of one new storage reservoir.
- **Pressure Zone 8:** As described in a previous section, the existing Zone 8 storage





**Legend**

- |                            |                              |                        |                       |
|----------------------------|------------------------------|------------------------|-----------------------|
| <b>5 Year Improvements</b> | <b>Buildout Improvements</b> | <b>Existing System</b> | <b>Inactive Tanks</b> |
| Tanks                      | Tanks                        | WTP                    | Abandoned Pipes       |
| Wells                      | Wells                        | Tanks                  | Street Centerlines    |
| Pumps                      | Pumps                        | Wells                  |                       |
| Valves                     | Valves                       | Pumps                  |                       |
| Pipes                      | Pipes                        | Valves                 |                       |
|                            |                              | Pipes                  |                       |

**PRELIMINARY**

**Figure 7.6**  
**Buildout Improvements**  
 Water Facilities Master Plan  
 West Valley Water District

reservoirs are planned for replacement as part of the 5-year planning horizon. The recommended tank volume is sized to meet the buildout storage need.

- **Bunker Hill Well Field:** Plans for the Bunker Hill supply include the construction of a 1.0 MG aeration tank, which will serve as an equalization reservoir for the discharge of planned groundwater wells 43, 44, 45, and 46.

The proposed storage reservoirs summarized on [Table 7.10](#) are briefly described as follows:

- **Z3-R3-4:** Construct a new 3.25 MG storage reservoir approximately 1,100 ft southwest of the intersection of Jurupa Avenue and Alder Avenue.
- **Z4-R4-4:** Construct a new 7.0 MG storage reservoir at the existing water storage reservoir 4-3 site.
- **Z5-R5-4:** Construct a new 2.6 MG storage reservoir within the planned Lytle Creek Ranch development approximately 1,000 feet northeast of the existing water storage reservoir 5-1 site.
- **Z6-R6-5:** Construct a new 6.0 MG storage reservoir at the existing water storage reservoir 6-2 site.
- **Z6-R6-6:** Construct a new 3.0 MG storage reservoir approximately 1,100 feet east of the intersection of Citrus Avenue and Segovia Lane.
- **Z7-R7-5:** Construct a new 3.4 MG storage reservoir at the intersection of Clearwater Parkway and Glen Helen Parkway.

## 7.7 PUMP STATION CAPACITY ANALYSIS

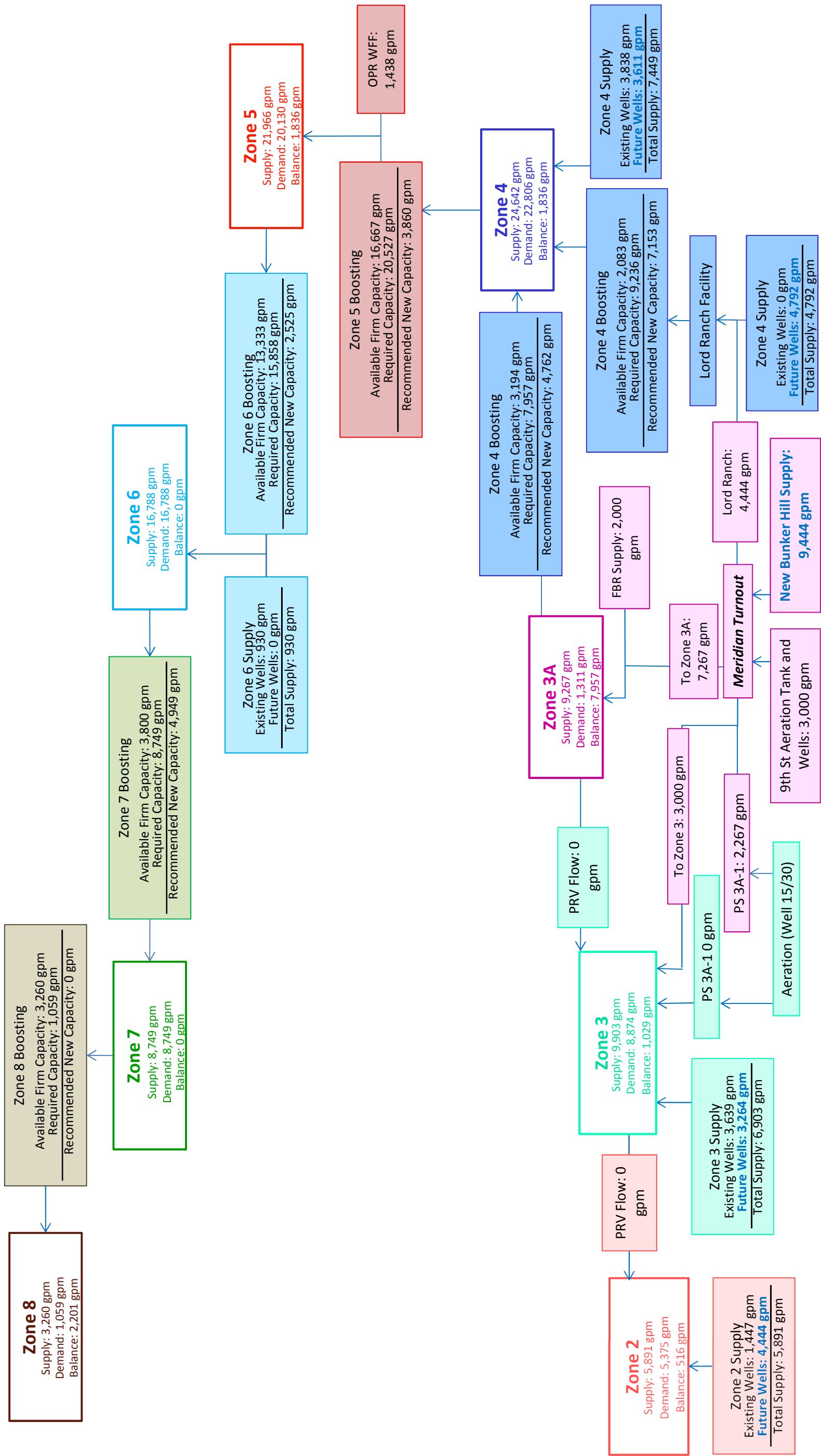
The section documents the existing pump station capacity, as well as the requirements to meet existing and future pumping needs. The pump station capacity evaluation is consolidated by pressure zone, and improvements are documented where necessary.

### 7.7.1 Existing Pump Station Capacity Requirements

The existing pump station requirements were identified for each station and are summarized on [Table 7.11](#). The table lists the existing pump station capacities and identifies the required capacity, based on the District criteria. The existing pump station capacity analysis indicates the District's current pump stations have adequate capacity to service existing customers.

### 7.7.2 Future Pump Station Capacity Requirements

Future pump station requirements were identified for each pressure zone and are summarized on [Figure 7.7](#). Based on the pump station criteria discussed in the System Performance and Design Criteria chapter, the combined firm capacity of each zone pump station is required to meet the Peak Day Demands of each zone in addition to any supply dependent zones. Pump station capacity requirements will vary based on supply scenarios discussed in an earlier section.



**Figure 7.7**  
**Buildout Supply and Boosting Capacity**  
Water Facilities Master Plan  
West Valley Water District

**PRELIMINARY**  
March 11, 2019

- NOTES**
1. Demands shown based on Buildout Peak Day Demand conditions (1.7 x 31.6 mgd)
  2. Total zone demand equal to a sum of the following:
    - Pressure zone demand
    - Total demand of supply dependent boosted zones
    - Any assumed PRV outflow
  3. Available pump station firm capacities equal to the sum capacity of each pressure zone pump station operating without its largest unit.
  4. Supply and boosting flowrates assume 16-hour a day operations; this excludes FBR and OPR WFF.
  5. OPR WFF treating minimum reliable Lytle Creek supply of 4,000 AFY.
- PRELIMINARY**
6. Recommended new Zone 4 boosting capacity equal to total supply delivered to Lord Ranch Facility less existing PS 4-1 firm capacity.
  7. Future wells shown include both the rehabilitation of existing offline wells and the construction of new wells.
  8. Zone 5 demands include delivery of 1.5 mgd of treated surface water to the City of Rialto.
  9. Recommended new boosting capacity based on 16-hour daily pumping.

**Table 7.11 Existing Pump Station Analysis**  
 Water Facilities Master Plan  
 West Valley Water District

Pump Station Name		Pressure Zone		Pressure Zone Demands			Pump Station Capacity Analysis				
	Source	Destination	Destination Zone (gpm)	Supply Dependent Zones (gpm)	Average Day Demand Supply Dependent Zones (gpm)	Total (gpm)	Total Capacity <sup>1</sup> (gpm)	Firm Capacity <sup>2</sup> (gpm)	Required Capacity <sup>3</sup> (gpm)	Credit for Firm Supply <sup>4</sup> (gpm)	Surplus/Deficiency (gpm)
<b>South System</b>											
<b>Pressure Zone 2</b>											
Wells (W18A)	-	3					1,447	0			
Total			3	-	1,291	0	1,447	0	2,195	0	-2,195
<b>Pressure Zone 3</b>											
2-1 PS	Wells 16, 17	3					1,000	0			
3A-1 PS	Wells 15, 30	3					1,933	1,933			
9th Street PS	-	3, 4					4,000	1,000			
Wells (W42)	-	3					1,447	0			
Total			3	2	1,903	1,291	8,380	2,933	5,429	0	-2,496
<b>Pressure Zone 3A</b>											
3A-1 PS	Wells 15, 30	3, 3A					0	0			
FBR	Wells 6, 11						2,000	2,000			
Total			3A	-	709	0	2,000	2,000	1,206	0	794
<b>North System</b>											
<b>Pressure Zone 4</b>											
4-1 PS	3	4					3,400	2,067			
4-2 PS	3A	4					4,800	3,200			
Total			4	-	1,273	3,733	8,200	5,267	8,511	0	-3,244
<b>Pressure Zone 5</b>											
5-1 PS	4	5					8,000	6,000			
5-2 PS	4	5					12,800	10,667			
Oliver P. Roemer WFF Effluent Pumps										2,484	
Total			5	6, 7, 8	1,313	2,420	20,800	16,667	6,346	2,484	12,804

PRELIMINARY

**Table 7.11 Existing Pump Station Analysis**  
 Water Facilities Master Plan  
 West Valley Water District

**PRELIMINARY**

Pump Station Name	Pressure Zone		Pressure Zone Demands			Pump Station Capacity Analysis				
	Source	Destination	Destination Zone (gpm)	Supply Dependent Zones (gpm)	Average Day Demand Supply Dependent Zones (gpm)	Total Capacity <sup>1</sup> (gpm)	Firm Capacity <sup>2</sup> (gpm)	Required Capacity <sup>3</sup> (gpm)	Credit for Firm Supply <sup>4</sup> (gpm)	Surplus/Deficiency (gpm)
<b>Pressure Zone 6</b>										
6-1 PS	5	6				6,200	4,733			
6-2 PS	5	6				10,360	8,633			
Wells (W24, W54)									317	
Total			6	7,8	1,443	16,560	13,367	4,115	317	9,569
<b>Pressure Zone 7</b>										
7-1 PS	6	7				5,267	3,800			
Total			7	8	938	5,267	3,800	1,662		2,138
<b>Pressure Zone 8</b>										
8-2 PS	7	8				4,375	3,260	0		
Total			8	-	40	4,375	3,260	68	0	3,192



Notes:

1. Firm capacity for each pressure zone is defined as the sum of the total capacity of each pump station pumping into the pressure zone, with each pump station operating without their largest unit.
2. Firm and Total capacity based on 16-hour daily pumping times.
3. Pump stations to supply PDD of destination zone and all other supply dependent zones.
4. Total pump station requirement reduced based on firm capacity of wells and treatment plants pumping directly in to destination zone.

4/2/2018



Supply Scenario 2 represents the most conservative pump station capacity requirements and improvements recommended are consistent with this scenario. The proposed pump stations are briefly described by pressure zone in the following sections.

**Pressure Zone 2:** This pressure zone has no existing pump stations and the existing wells, in addition to the planned future wells, will provide sufficient supply capacity to meet the peak day demands of the zone.

**Pressure Zone 3:** The pump station capacity requirements for this zone are supplied by Pump Station 3A, Pump Station 2-1, and the 9<sup>th</sup> Street Pump Station through the Meridian Turnout. This zone has no supply dependent demands and a portion of the zone demands are provided by existing and planned future wells. Based on the firm capacity of the existing pump stations, this pressure zone has pumping capacity to meet the peak day demand requirements. However, in order to create firm capacity at the existing Pump Station 2-1, one new pump is recommended.

- **Z3-PS2-1:** Construct one additional 1,500 gpm pump at the existing Pump Station 2-1 site. This will increase the total station capacity to 3,000 gpm and create a firm capacity of 1,500 gpm.

**Pressure Zone 3A:** The pump station capacity requirements for this zone are supplied by pump station 3A and the 9<sup>th</sup> Street Pump Station through the Meridian Turnout. This zone has no supply dependent demands and a portion of the zone demands are provided by the FBR and existing and planned future wells. Based on the firm capacity of the existing pump stations, this zone has a pump station capacity surplus and no improvements are recommended.

**Pressure Zone 4:** The pump station capacity requirements for this zone are supplied by Pump Station 4-1 and Pump Station 4-2. In addition to meeting the peak day demands for Pressure Zone 4, these pump stations must also provide water to Pressure Zones 5, 6, 7 and 8, which are supply dependent pressure zones. Based on these requirements approximately 16,000 gpm of additional pump station capacity is recommended in this zone, which is planned to be met through the construction of two new pump stations.

- **Z4-PS4-2:** Construct a new pump station at the existing Pump Station 4-2 site. This pump station is planned to have four 2,400 gpm pumps, three duty and one standby, for a total station capacity of 9,600 gpm. It should be noted that if space is available the recommended pumps could be incorporated into the existing Pump Station 4-2.
- **Z4-PS4-3:** Construct a new pump station at the existing Lord Ranch Facility. This pump station is planned to have four 2,980 gpm pumps, three duty and one standby.. This pump station is planned to discharge into the existing 30-inch transmission main in Pepper Avenue north to Highland Avenue.

**Pressure Zone 5:** The pump station capacity requirements for this zone are supplied by Pump Station 5-1 and Pump Station 5-2. In addition to meeting the peak day demands for Pressure

Zone 5 these pump stations must also provide water to Pressure Zone 6, 7, and 8, which are supply dependent pressure zones. A portion of these demands will be met by surface water treatment at Roemer WFF. Based on the existing pumping capacity and planned supply capacity at the Roemer WFF, approximately 6,000 gpm of additional pump station capacity is recommended in this zone, which is planned to be met through the construction of one new pump station.

- **Z5-PS5-3:** Construct a new pump station within the planned Lytle Creek Ranch development approximately 2,200 feet northeast of the existing water storage reservoir 4-3 site. This pump station is planned to have four 2,000 gpm pumps, three duty and one standby, for a total station capacity of 8,000 gpm.

**Pressure Zone 6:** The pump station capacity requirements for this zone are supplied by Pump Station 6-1 and Pump Station 6-2. In addition to meeting the peak day demands for Pressure Zone 6, these pump stations must also provide water to Pressure Zone 7 and 8, which are supply dependent pressure zones. A portion of these demands are offset by an existing groundwater well. Based on these requirements approximately 3,900 gpm of additional pump station capacity is recommended in this zone, which is planned to be met through the construction of one new pump station.

- **Z6-PS6-3:** Construct a new pump station within the planned Lytle Creek Ranch development approximately 1,000 feet northeast of the existing water storage reservoir 5-1 site. This pump station is planned to have four 1,300 gpm pumps, three duty and one standby, for a total station capacity of 4,200 gpm.

**Pressure Zone 7:** The pump station capacity requirements for this zone are supplied by Pump Station 7-1. In addition to meeting the peak day demands for Pressure Zone 7, this pump station must also provide water to Pressure Zone 8, which is a supply dependent pressure zone. Based on these requirements approximately 7,500 gpm of additional pump station capacity is recommended in this zone, which is planned to be met through the construction of two new pump stations.

- **Z7-PS7-2:** Construct a new pump station at the existing Pump Station 7-1 location. This pump station is planned to have three 2,000 gpm pumps, two duty and one standby, for a total station capacity of 6,000 gpm.
- **Z7-PS7-3:** Construct a new pump station within the planned Lytle Creek Ranch development approximately 1,500 feet northeast of the existing water storage reservoir 6-2 site. This pump station is planned to have three 1,750 gpm pumps, two duty and one standby, for a total station capacity of 5,250 gpm.

**Pressure Zone 8:** The pump station capacity requirements for this zone are provided by Pump Station 8-2. The existing pump station is capable of meeting the buildout peak day demands.

However, in order to create hydraulic reliability in this zone one new pump station is recommended with a capacity equal to the existing Pump Station 8-1.

- **Z8-PS8-3:** Construct a new pump station at the intersection of Clearwater Parkway and Glen Helen Parkway. This pump station is planned to have three 1,630 gpm pumps, two duty and one standby, for a total station capacity of 4,890 gpm.

**Bunker Hill Well Field:** The new Bunker Hill wellfield, comprised of future Wells 43, 44, 45, and 46 as discussed in a previous section, will require a new pump station to transfer the extracted groundwater from the planned aeration tank to the existing 30-inch transmission main at the existing pump station 3A-1 site. This pump station is planned to have a firm capacity of 14,000 gpm, which is equal to the sum of the planned design capacities of the recommended Bunker Hill supply wells.

- **BH-PS:** Construct a new pump station with five 3,500 gpm pumps, four duty and one standby, for a total station capacity of 17,500 gpm.

## 7.8 PIPELINE IMPROVEMENTS TO SERVE FUTURE GROWTH

The buildout of the District's service area includes development outside of the extent of the existing domestic water distribution system. New pipelines are recommended to serve future growth as well as increase the hydraulic reliability of the domestic water distribution system. Each pipeline improvement is assigned a uniquely coded identifier, which is intended to aid in defining the location of the improvements for mapping purposes. These identifiers reflect the pressure zone and sequence in the improvement schedule. The pipeline improvements are described in detail on the following pages.

### 7.8.1 Pressure Zone 2

The following section documents pipeline improvements within Pressure Zone 2.

- **Z2-P1:** Construct new parallel 24-inch and 8-inch pipelines in Eighth Street from Locust Avenue to Cedar Avenue.
- **Z2-P2:** Construct a new 8-inch pipeline in Eighth Street from Locust Avenue to Linden Avenue.
- **Z2-P3:** Replace an existing 4-inch and 6-inch pipeline in Ninth Street from Locust Avenue to Linden Avenue with a new 8-inch pipeline.
- **Z2-P4:** Replace an existing 6-inch and 8-inch pipeline in Tenth Street from Locust Avenue to Linden Avenue with a new 8-inch pipeline.
- **Z2-P5:** Construct a new 8-inch pipeline in Eleventh Street from Locust Avenue to Linden Avenue.

- **Z2-P6:** Replace an existing 6-inch pipeline in Maple Street from Eleventh Street to Eighth Street with a new 12-inch pipeline.
- **Z2-P7:** Construct a new 12-inch pipeline in Santa Ana Avenue from Linden Avenue to Cedar Avenue.
- **Z2-P8:** Replace an existing 12-inch pipeline in Santa Ana Avenue with a new 20-inch pipeline from Cedar Avenue to Riverside Avenue.
- **Z2-P9:** Construct a new 24-inch pipeline in Pepper Avenue from approximately 1,200 ft north of Slover Avenue to approximately 300 ft south of I-10. This pipeline includes a casing to cross beneath the South Pacific Railway.
- **Z2-P10:** Construct a new 24-inch pipeline in Pepper Avenue and San Bernardino Avenue from approximately 400 ft north of the intersection of Valley Boulevard and Pepper Avenue to the intersection of San Bernardino Avenue and Eucalyptus Avenue.

### 7.8.2 Pressure Zone 3

The following section documents pipeline improvements within Pressure Zone 3.

- **Z3-P1:** Construct a new 24-inch pipeline in future right-of-way from planned reservoir 3-4 to Alder Avenue.
- **Z3-P2:** Construct a new 24-inch pipeline in future right-of-way from Alder Avenue to Locust Avenue.
- **Z3-P3:** Construct a new 12-inch pipeline in Locust Avenue and Armstrong Road from Jurupa Avenue to approximately 2,200 ft southwest of Eighth Street.
- **Z3-P4:** Replace existing 4-inch, 6-inch, and 12-inch pipelines in Santa Ana Avenue with a new 12-inch pipeline from Alder Avenue to Linden Avenue.
- **Z3-P5:** Construct a new 16-inch pipeline in Santa Ana Avenue from Linden Avenue to Cedar Avenue.
- **Z3-P6:** Replace existing 2-inch, 4-inch, and 6-inch pipelines in and north of Valley Boulevard generally between Cedar Avenue and larch Avenue.
- **Z3-P7:** Replace existing 4-inch and 6-inch pipelines north of Valley Boulevard generally between Olive Street and Spruce Avenue.
- **Z3-P8:** Construct a new 16-inch pipeline in Valley Boulevard from approximately 850 ft west of Eucalyptus Avenue to Eucalyptus Avenue.

### 7.8.3 Pressure Zone 3A

The following section documents pipeline improvements within Pressure Zone 3A.

- **Z3A-P1:** Construct a new 10-inch pipeline in Cactus Avenue from James Street to Alru Street.

### 7.8.4 Pressure Zone 4

The following section documents pipeline improvements within Pressure Zone 4.

- **Z4-P1:** Construct a parallel 24-inch pipeline in Cactus Avenue from Baseline Road to I-210.
- **Z4-P2:** Construct a parallel 24-inch pipeline in Cactus Avenue from Casmalia Street to Riverside Avenue.
- **Z4-P3:** Construct a parallel 30-inch pipeline in Pepper Avenue, Highland Avenue, Oakdale Avenue, and in the planned Lytle Creek Ranch development from the existing Lord Ranch facility to reservoir 4-3.
- **Z4-P4:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development to Well 35C.
- **Z4-P5:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development to Well 5A.
- **Z4-P6:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development to Well 4A.
- **Z4-P7:** Construct a new 18-inch pipeline in the Planned Lytle Creek Ranch development.
- **Z4-P8:** Construct a new 20-inch pipeline in Future ROW from Sycamore Avenue to Planned Lytle Creek Ranch development.
- **Z4-P9:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development.
- **Z4-P10:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development to Well 34B.
- **Z4-P11:** Construct a new 24-inch pipeline in the Planned Lytle Creek Ranch development.
- **Z4-P12:** Construct a new 12-inch pipeline in the Planned Lytle Creek Ranch development.
- **Z4-P13:** Construct a new 24-inch pipeline in the Planned Lytle Creek Ranch development.
- **Z4-P14:** Construct a new 24-inch pipeline in the planned Lytle Creek Ranch development.



- **Z4-P15:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z4-P16:** Construct a new 24-inch pipeline in the planned Lytle Creek Ranch development.

#### 7.8.5 Pressure Zone 5

The following section documents pipeline improvements within Pressure Zone 5.

- **Z5-P1:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z5-P2:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z5-P3:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z5-P4:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z5-P5:** Construct a new 16-inch pipeline in the planned Lytle Creek Ranch development.
- **Z5-P6:** Construct a new 24-inch pipeline in the planned Lytle Creek Ranch development.

#### 7.8.6 Pressure Zone 6

The following section documents pipeline improvements within Pressure Zone 6.

- **Z6-P1:** Construct a new 12-inch pipeline in Persimmon Street and Summit Avenue generally between Locust Avenue and Cedar Avenue
- **Z6-P2:** Replace existing 4-inch and 6-inch pipelines in Persimmon Street and Summit Avenue with a new 8-inch pipeline generally between Locust Avenue and Cedar Avenue.
- **Z6-P3:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P4:** Construct a new 24-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P5:** Construct a new 20-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P6:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P7:** Construct a new 16-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P8:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P9:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P10:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P11:** Construct a new 24-inch pipeline in the planned Lytle Creek Ranch development.

- **Z6-P12:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z6-P13:** Construct a new 12-inch pipeline in Sunrise Drive from Sierra Avenue to Citrus Avenue.
- **Z6-P14:** Construct a new 12-inch pipeline in Cypress Avenue from Sunrise Avenue to Casa Grande Avenue.
- **Z6-P15:** Construct a new 24-inch pipeline in Citrus Avenue from planned reservoir 6-6 to approximately 1,000 ft south of Duncan Canyon Road.
- **Z6-P16:** Construct a new 12-inch pipeline in future right-of-way from Knox Avenue to Citrus Avenue.

### 7.8.7 Pressure Zone 7

The following section documents pipeline improvements within Pressure Zone 7.

- **Z7-P1:** Construct a new 12-inch pipeline in Alder Avenue from Via Bello Drive to Lytle Creek Ranch Development.
- **Z7-P2:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development
- **Z7-P3:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P4:** Construct a new 16-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P5:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P6:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P7:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P8:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P9:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P10:** Construct a new 18-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P11:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P12:** Construct a new 12-inch pipeline in the planned Lytle Creek Ranch development.
- **Z7-P13:** Construct a new 12-inch pipeline in Cypress Avenue from Terra Vista Drive to Sunrise Drive.
- **Z7-P14:** Construct a new 16-inch pipeline in from Terra Vista Drive to Duncan Canyon Road.

- **Z7-P15:** Construct a new 12-inch pipeline in Sunrise Drive from Sierra Avenue to Citrus Avenue
- **Z7-P16:** Construct a new 18-inch pipeline in future right-of-way from Citrus Avenue to Lytle Creek Road. This pipeline includes a casing to cross beneath I-10.
- **Z7-P17:** Construct a new 12-inch pipeline in Coyote Canyon Road from Lytle Creek Road to Hawk Ridge Road.
- **Z7-P18:** Construct a new 12-inch pipeline in planned future development south of Duncan Canyon Road.

### 7.8.8 Bunker Hill Supply

The following section documents pipeline improvements to convey future Bunker Hill supply to the existing District transmission system.

- **BH-P1:** Construct new 18-inch pipelines from the planned wells 43, 44, 45, and 46 to the planned in Alder Avenue from Via Bello Drive to Lytle Creek Ranch Development.
- **BH-P1:** Construct new 18-inch pipelines from the planned wells 43, 44, 45, and 46 to the planned in Alder Avenue from Via Bello Drive to Lytle Creek Ranch Development.
- **BH-P2:** Construct a new 36-inch pipeline from the planned Bunker Hill supply to the existing pump station 3A site.

## CHAPTER 8 – CAPITAL IMPROVEMENT PROGRAM

This chapter provides a summary of the recommended domestic water system improvements to mitigate existing capacity deficiencies and to accommodate anticipated future growth. The chapter also presents the cost criteria and methodologies for developing the capital improvement program. Finally, a capacity allocation analysis, usually used for cost sharing purposes, is also included.

### 8.1 COST ESTIMATE ACCURACY

Cost estimates presented in the CIP were prepared for general master planning purposes and, where relevant, for further project evaluation. Final costs of a project will depend on several factors including the final project scope, costs of labor and material, and market conditions during construction.

The Association for the Advancement of Cost Engineering (AACE International), formerly known as the American Association of Cost Engineers has defined three classifications of assessing project costs. These classifications are presented in order of increasing accuracy: Order of Magnitude, Budget, and Definitive.

- **Order of Magnitude Estimate.** This classification is also known as an “original estimate”, “study estimate”, or “preliminary estimate”, and is generally intended for master plans and studies.

This estimate is not supported with detailed engineering data about the specific project, and its accuracy is dependent on historical data and cost indexes. It is generally expected that this estimate would be accurate within -30 percent to +50 percent.

- **Budget Estimate.** This classification is also known as an “official estimate” and generally intended for predesign studies. This estimate is prepared to include flow sheets and equipment layouts and details. It is generally expected that this estimate would be accurate within -15 percent to +30 percent.
- **Definitive Estimate.** This classification is also known as a “final estimate” and prepared during the time of contract bidding. The data includes complete plot plans and elevations, equipment data sheets, and complete specifications. It is generally expected that this estimate would be accurate within -5 percent to + 15 percent.

Costs developed in this study should be considered “Order of Magnitude” and have an expected accuracy range of **-30 percent** and **+50 percent**.

## 8.2 COST ESTIMATE METHODOLOGY

Cost estimates presented in this chapter are opinions of probable construction and other relevant costs developed from several sources including cost curves, Akel experience on other master planning projects, and input from District staff. Where appropriate, costs were escalated to reflect the more current Engineering News Records (ENR) Construction Cost Index (CCI).

This section documents the unit costs used in developing the opinion of probable construction costs, the Construction Cost Index, the land acquisition costs, and markups to account for construction contingency and other project related costs.

### 8.2.1 Unit Costs

The unit cost estimates used in developing the Capital Improvement Program are summarized on [Table 8.1](#). Domestic water pipeline unit costs are based on length of pipes, in feet. Storage reservoir unit costs are based on capacity, per million gallons (MG). Pump Station costs are based on an equation that utilizes the total recommended pump station improvement capacity. Well construction costs are preliminary and are intended for planning purposes; a well site investigation is recommended to determine site specific costs involved in new well construction.

The unit costs are intended for developing the Order of Magnitude estimate and do not account for site specific conditions, labor and material costs during the time of construction, final project scope, implementation schedule, detailed utility and topography surveys for reservoir sites, investigation of alternative routings for pipes, and other various factors. The capital improvement program included in this report accounts for construction and project-related contingencies as described in this chapter.

### 8.2.2 Treatment Costs

Kleinfelder used an analogous cost estimating methodology, which consisted of researching similar facilities and documenting those costs for the purposes of estimating proposed capital improvements costs for the water treatment facilities for the District. Based on water quality data, the best available technology was identified for each specific water source and its associated contaminant (s).

- Microsand based Actiflo coagulation and sedimentation is selected as a practical technology for wellhead treatment to remove arsenic from ground water most commonly occurring in the Lytle Creek Basin water.
- Single pass IX technology is selected for perchlorate removal, a contaminant identified in ground waters of the Rialto Basin and Riverside-Arlington Basin.
- Regenerable IX technology is selected for nitrate removal, the contaminant in the ground water wells of Rialto Basin, Riverside-Arlington Basin and Chino Basin.



**Table 8.1 Unit Costs**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Pipelines <sup>1</sup>	
Pipe Size (in)	New/Parallel/Replacement (\$/unit length)
6	100
8	133
10	167
12	200
16	267
18	300
20	333
24	400
30	500
36	600
42	700
Pump Station	
Estimated Pumping Station Project Cost= $2.075 * 10^{(0.7583 * \log(Q) + 3.1951)}$ where Q is in gpm	
Storage <sup>2</sup>	
\$1.38 / gallon	
Land Acquisition Cost <sup>3</sup>	
\$7.99 per square foot	
Pipeline Casings	
\$24 per inch diameter per linear foot	
Groundwater Wells	
\$3,000,000 per well	



Notes :

1. Pipeline unit cost based on \$15/in.-diameter/foot, consistent with 2014 East Valley Water District Water Master Plan
2. Source: 2014 East Valley Water District Water Master Plan
3. Source: Land appraisal report received from District staff October 12, 2017.
4. Unit costs escalated based on an ENR CCI Index Value of 10,889 (01/2018)

The above water treatment technologies were selected solely for purpose of construction cost estimates for this Water Master Plan, as representatives of reasonable cost technologies.

To estimate costs for the proposed facilities, known cost of similar designed or constructed facilities were prorated proportionally with the flow rates. To accommodate the economy of scale and to come up with cost “*multipliers*”, the prorated values are powered with power index varying from 0.5 to 0.65. Finally, the costs were adjusted using an “*Escalation Factor*,” which was calculated for each individual facility assuming 2.5% for annual inflation.

Details of the applied methodology, selected treatment technologies, sources of analogous cost information (Cost basis), calculated *Multipliers* and *Escalation Factors*, and estimated cost for the proposed wellhead treatments are presented in [Table 8.2](#).

### 8.2.3 Construction Cost Index

Costs estimated in this study are adjusted utilizing the Engineering News Record (ENR) Construction Cost Index (CCI), which is widely used in the engineering and construction industries.

The costs in this Water Facilities Master Plan were benchmarked using a 20-City national average ENR CCI of 10,889, reflecting a date of January 2018.

### 8.2.4 Land Acquisition

Construction of pipelines is generally assumed to be within existing or future street right-of-ways. A land acquisition fee for the construction of storage reservoirs and pump stations was assumed based on recent land acquisitions.

### 8.2.5 Construction Contingency Allowance

Knowledge about site-specific conditions for each proposed project is limited at the master planning stage; therefore, construction contingencies were used. The estimated construction costs in this master plan include a **20 percent** contingency allowance to account for unforeseen events and unknown field conditions.

### 8.2.6 Project Related Costs

The capital improvement costs also account for project-related costs, comprising of engineering design, project administration (developer and District staff), construction management and inspection, and legal costs. The project related costs in this master plan were estimated by applying an additional **15 percent** to the estimated construction costs.

**Table 8.2 CIP Cost Estimates for Wellhead Treatments**  
 Water Master Plan Update  
 West Valley Water District

PRELIMINARY

No.	Well	Contaminant	Applicable Technology	Well Capacity, (gpm)	Multiplier	Escalation factor, 2.5% per year	CIP Wellhead Treatment Cost		Comment
							2024	2025	
<b>Lytle Creek Basin</b>									
1	W7	No WQ issues	NA	2,100	NA	NA	50,000	0	Rehab and retest existing well
2	W8A	As	Coagulation	2,400	0.93	NA	3,288,359	0	Construct Arsenic treatment, assumed Actiflo
3	W36	As	Coagulation	2,700	1.00	NA	3,550,000	0	Construct Arsenic treatment, assumed Actiflo
4	W34B	Assumed, As	Coagulation	2,000	0.82	NA	0	2,920,864	Construct Arsenic treatment, assumed Actiflo
5	W35C	Assumed, As	Coagulation	2,000	0.82	NA	0	2,920,864	Construct Arsenic treatment, assumed Actiflo
							<b>6,888,359</b>	<b>5,841,728</b>	
<b>Rialto Basin</b>									
6	W16	CIO4, NO2	IX for nitrate	1,500	1.00	1.22	0	5,716,015	Current CIO4 is OK. Construct IX for NO2 only
7	W17	CIO4	Existing IX is OK	1,250	NA	NA	0	0	Current IX for CIO4 is OK. Regular maintenance, only
8	W22A	NO2	IX for nitrate	1,500	1.00	1.22	0	5,716,015	Construct IX for NO2 only
9	W24	No WQ issue	NA	600	NA	-	0	0	Regular Maintenance, Only
10	W54	Air	Dearation, break tanks	1,000	NA	NA	150,000	0	Install 30 minute RT break tank
							<b>150,000</b>	<b>11,432,030</b>	
<b>Bunker Hill Basin</b>									
11	W15	No WQ issue	NA	2,700	NA	-	0	0	Regular Maintenance, Only
12	W30	No WQ issue	NA	3,100	NA	-	0	0	Regular Maintenance, Only
13	W43	No WQ issue	NA	3,500	NA	-	0	0	Well construction
14	W44	No WQ issue	NA	3,500	NA	-	0	0	Well construction
15	W45	No WQ issue	NA	3,500	NA	-	0	0	Well construction
16	W46	No WQ issue	NA	3,500	NA	-	0	0	Well construction
							<b>0</b>	<b>0</b>	
<b>North Riverside Basin</b>									
17	W18A	CIO4, NO2	IX, FBR	2,700	1.34	1.22	7,668,839	0	Current CIO4 is OK. IX for NO2 is proposed
18	W41	CIO4	IX, FBR	2,200	0.84	1.22	550,000	0	IX for NO2 only <sup>2</sup>
19	W42	CIO4 and NO2	IX, FBR	2,200	1.28	1.22	0	9,246,213	IX for Nitrate and IX for Perchlorate
20	W29A	CIO4 and NO2	IX, FBR	1,500	1.00	1.22	0	7,208,559	IX for Nitrate and IX for Perchlorate
21	W40	CIO4 and NO2	IX, FBR	1,500	1.00	1.22	0	7,208,559	IX for Nitrate and IX for Perchlorate
22	W51	CIO4 and NO2	IX, FBR	3,000	1.57	1.22	0	11,311,441	IX for Nitrate and IX for Perchlorate
23	W52	CIO4 and NO2	IX, FBR	2,000	1.21	1.22	0	8,690,777	IX for Nitrate and IX for Perchlorate
24	W50	CIO4 and NO2	IX, FBR	1,500	1.00	1.22	0	7,208,559	IX for Nitrate and IX for Perchlorate
							<b>8,218,839</b>	<b>50,874,108</b>	
<b>Chino Basin</b>									
25	W39	No WQ issue	NA	4,000	NA	-	9,334,214	0	Well drilled but not equipped. Requires treatment.
							<b>9,334,214</b>	<b>0</b>	
							<b>24,591,412</b>	<b>68,147,866</b>	

Notes:  
 1. Table prepared by Kleinfelder, Inc staff February 2018.  
 2. District staff indicated that 2 available treatment vessels are currently unused at the Reservoir 2-1 site. Those vessels may potentially be moved to W41 for treatment purposes. Cost shown accounts for this assumption.  
 3. Well costs include master planning contingencies provided by Kleinfelder, Inc staff, which include overhead, margin, insurance and bonding, and contingency.

3/7/2019

## 8.3 CAPITAL IMPROVEMENT PROGRAM

This section documents the capital improvement program and the allocation of costs to meet the requirements of AB1600.

### 8.3.1 Capital Improvement Costs

The Capital Improvement Program costs for the projects identified in this master plan for mitigating existing system deficiencies and for serving anticipated future growth throughout the District are summarized by improvement type on [Table 8.3](#) through [Table 8.6](#).

As summarized in previous chapters the District is currently planning a 6.0 mgd expansion to the OPR WFF; however, in the event additional surface water supplies become available the District may elect to increase this expansion up to 16.0 mgd. Therefore, for conservative planning purposes, this capital improvement program includes the cost of a 16.0 mgd expansion. This cost estimate, prepared by Carollo Engineers, is summarized on [Table 8.4](#).

Each improvement was assigned a unique coded identifier associated with the improvement type, and are summarized graphically on [Figure 8.1](#) through [Figure 8.4](#). A hydraulic profile schematic of the buildout of the water distribution system is provided on [Figure 8.5](#).

The estimated construction costs include the baseline costs plus **20 percent** contingency allowance to account for unforeseen events and unknown field conditions, as described in a previous section. Capital improvement costs include the estimated construction costs plus **15 percent** project-related costs (engineering design, project administration, construction management and inspection, and legal costs. It should be noted that contingencies for costs associated with well construction and treatment were provided by Kleinfelder Inc and account for margin, overhead, insurance and bonding, or contingencies.

### 8.3.2 Recommended Cost Allocation Analysis

Cost allocation analysis is needed to identify improvement funding sources, and to establish a nexus between development impact fees and improvements needed to service growth. In compliance with the provisions of Assembly Bill AB 1600, the analysis differentiates between the project needs of servicing existing users and for those required to service anticipated future developments. The cost responsibility is based on model parameters for existing and future land use, and may change depending on the nature of development. [Table 8.3](#) lists each improvement, and separates the cost by responsibility between existing and future users.

### 8.3.3 5-Year Capital Improvement Costs and Phasing

The capital improvement program costs and phasing for the next five years are summarized on [Table 8.7](#). This plan includes the total costs for pipelines, tanks, booster stations, and valves to be

Figure 8.2

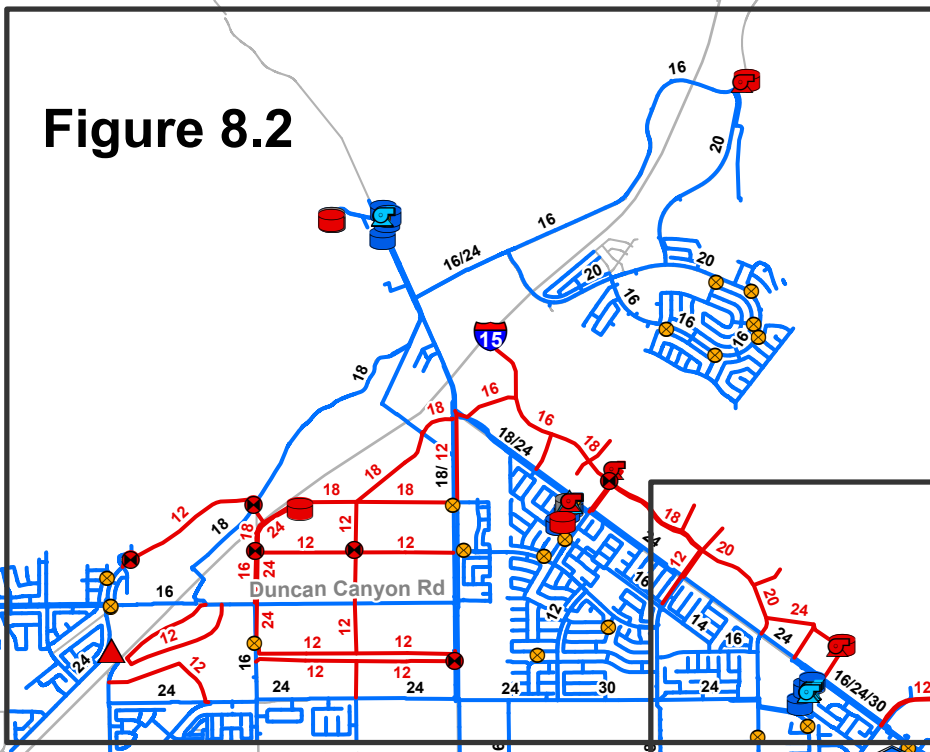


Figure 8.3

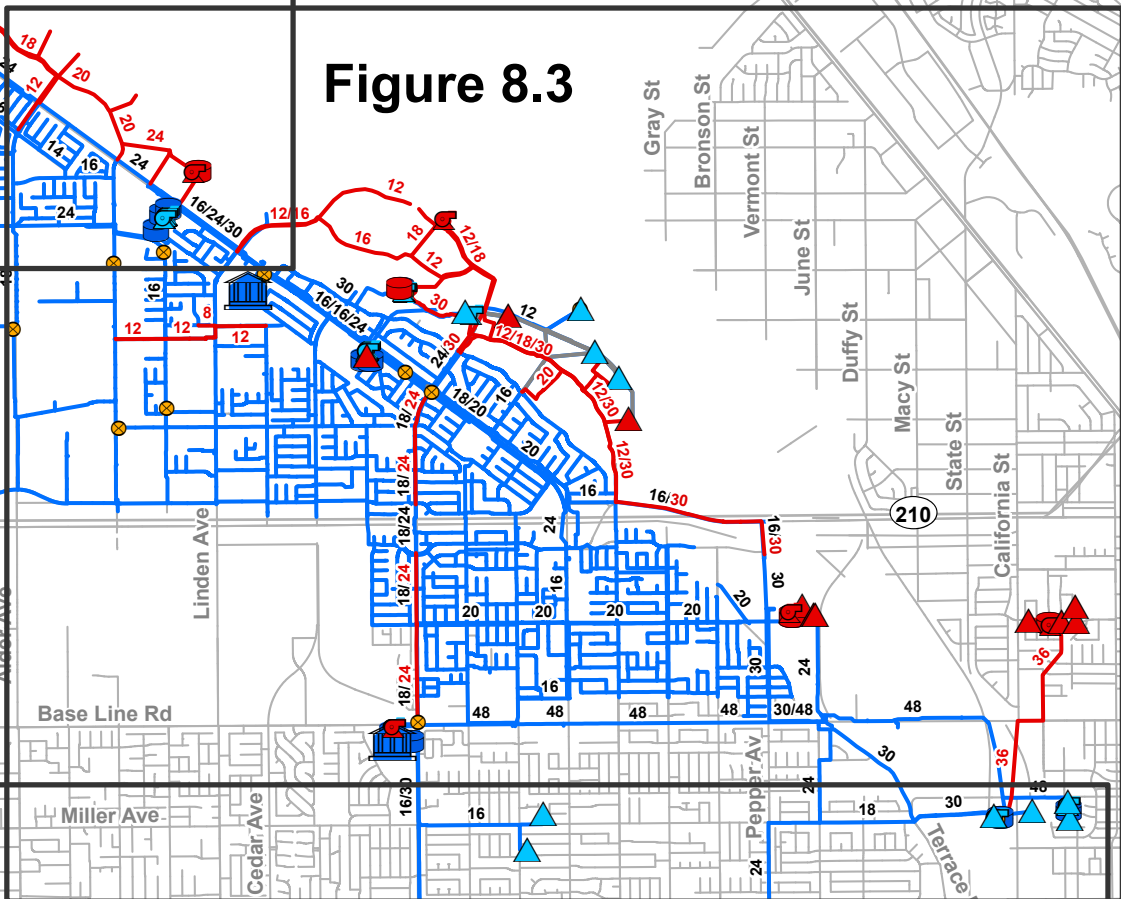
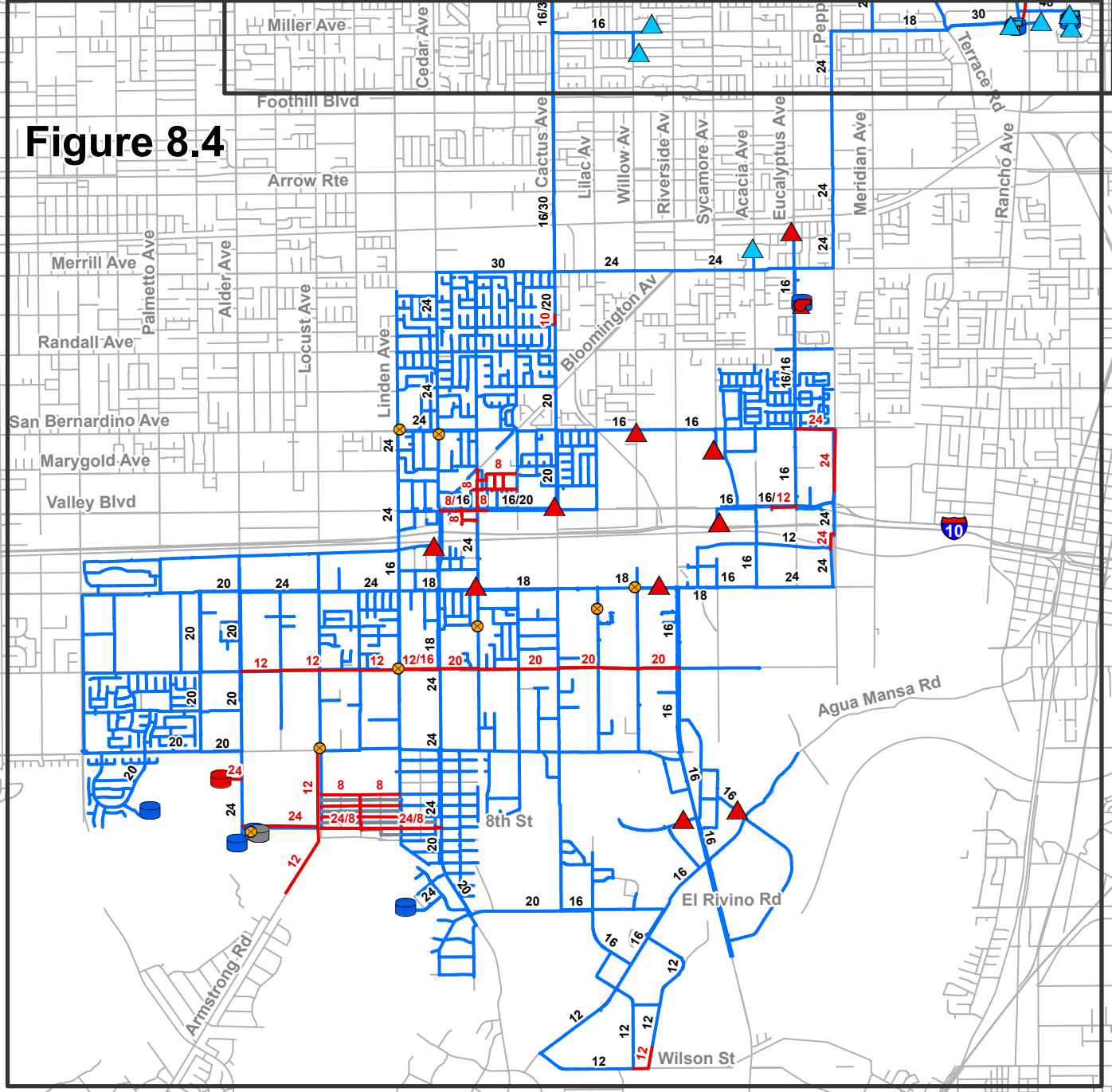


Figure 8.4



Legend

- |                            |                        |                       |
|----------------------------|------------------------|-----------------------|
| <b>System Improvements</b> | <b>Existing System</b> | <b>Inactive Tanks</b> |
| Tanks                      | WTP                    | Abandoned Pipes       |
| Wells                      | Tanks                  | Street Centerlines    |
| Pumps                      | Wells                  |                       |
| Valves                     | Pumps                  |                       |
| Pipes                      | Valves                 |                       |
|                            | Pipes                  |                       |

PRELIMINARY

**Figure 8.1**  
**Future Improvements**  
**Keymap**  
 Water Facilities Master Plan  
 West Valley Water District





**Legend**

**System Improvements**

- Tanks
- Wells
- Pumps
- Valves
- Pipes

**Existing System**

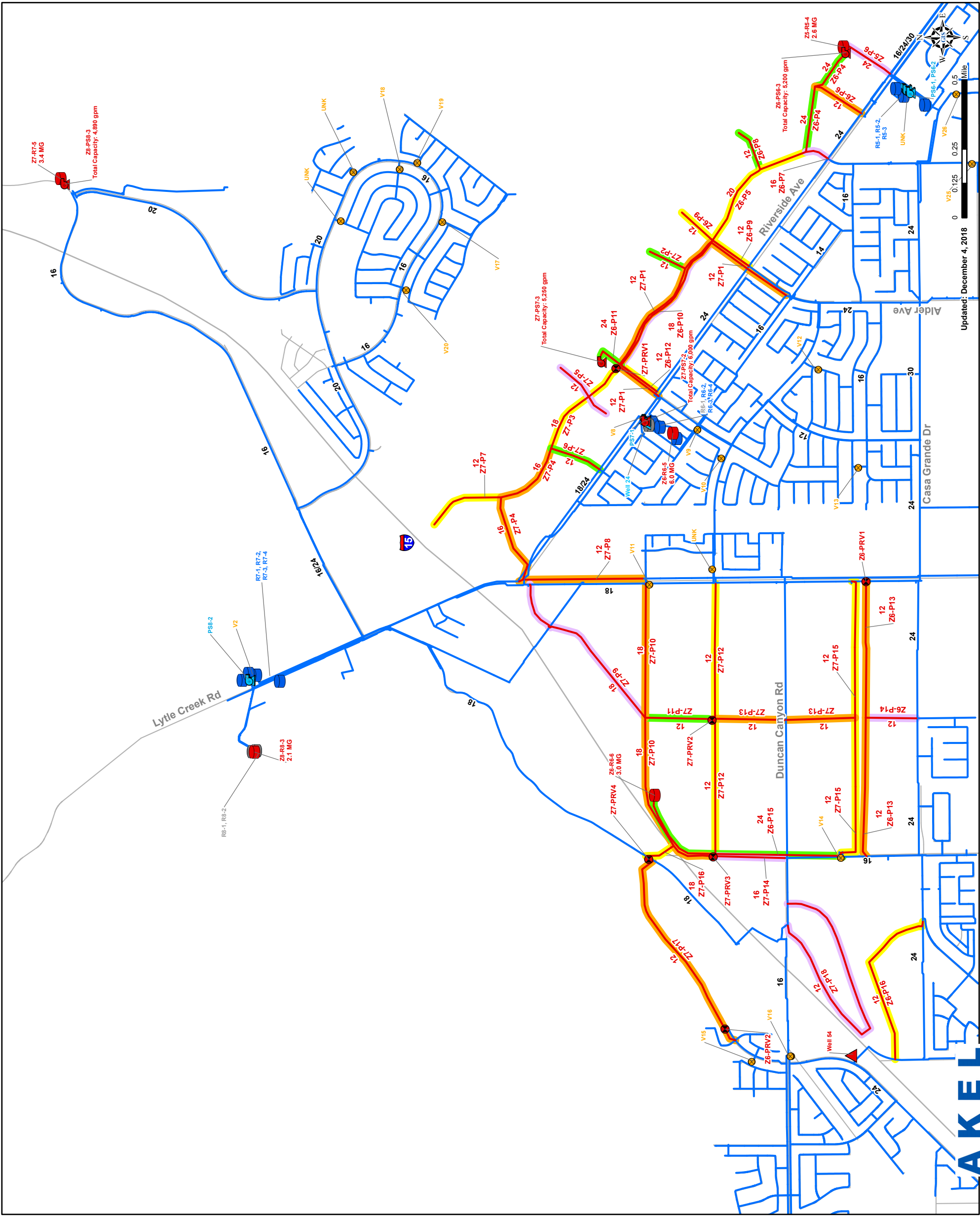
- WTP
- Tanks
- Wells
- Pumps
- Valves
- Pipes
- Inactive Tanks
- Abandoned Pipes
- Street Centerlines

**Note:**  
Pipe highlighting indicates limits of individual segments as identified in the CIP table.

**PRELIMINARY**

**Figure 8.2**  
**Future Improvements**

Water Facilities Master Plan  
West Valley Water District












Updated: December 4, 2018  
Scale: 0, 0.125, 0.25, 0.5, 1 Mile  
File Path: P:\GIS\GIS Projects\West Valley WDW\WWD\_Fig8.2\_FutureImprovements\_NorthWest\_T20418.mxd

### Legend

#### System Improvements

-  Tanks
-  Wells
-  Pumps
-  Valves
-  Pipes

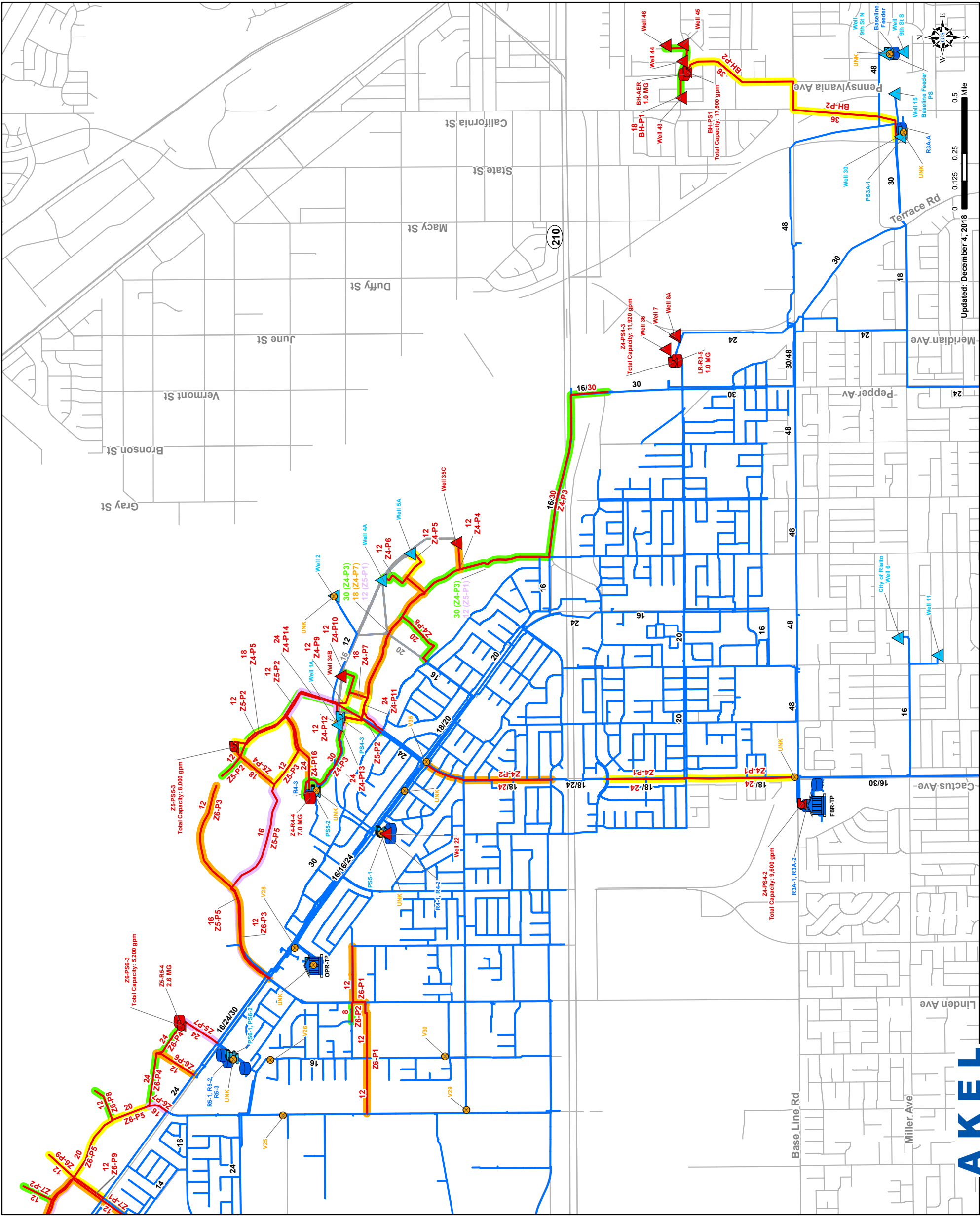
#### Existing System

-  WTP
-  Tanks
-  Wells
-  Pumps
-  Valves
-  Pipes
-  Inactive Tanks
-  Abandoned Pipes
-  Street Centerlines

Note: Pipe highlighting indicates limits of individual segments as identified in the CIP table.

## PRELIMINARY

### Figure 8.3 Future Improvements Water Facilities Master Plan West Valley Water District












Updated: December 4, 2018  
File Path: P:\GIS\GIS\_P\Projects\West Valley\WV\WVMD\_Fig-3\_FutureImprovements\_NorthEast\_120418.mxd

# Legend

## System Improvements

-  Tanks
-  Wells
-  Pumps
-  Valves
-  Pipes

## Existing System

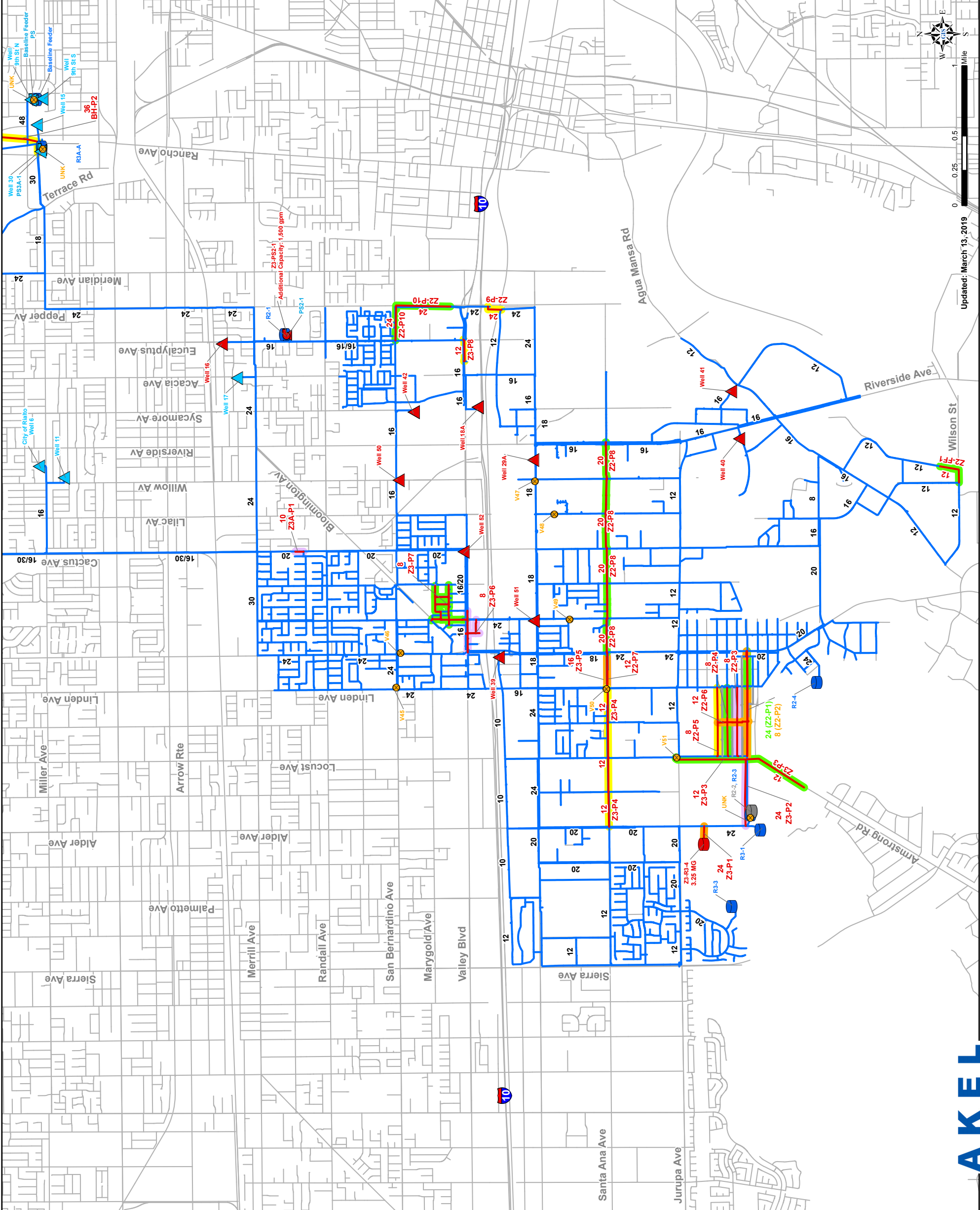
-  WTP
-  Tanks
-  Wells
-  Pumps
-  Valves
-  Pipes
-  Inactive Tanks
-  Abandoned Pipes
-  Street Centerlines

**Note:**  
Pipe highlighting indicates limits of individual segments as identified in the CIP table.

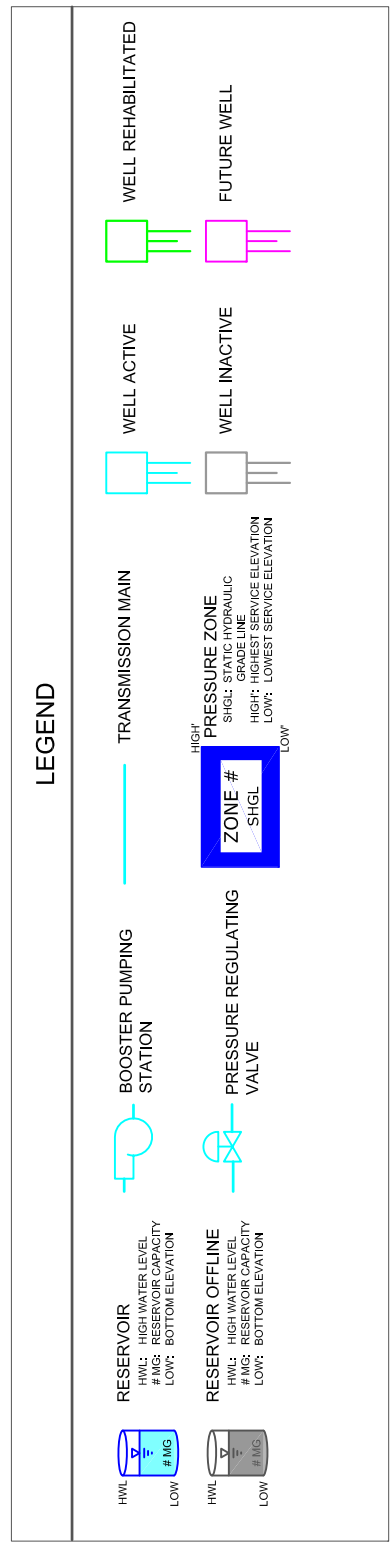
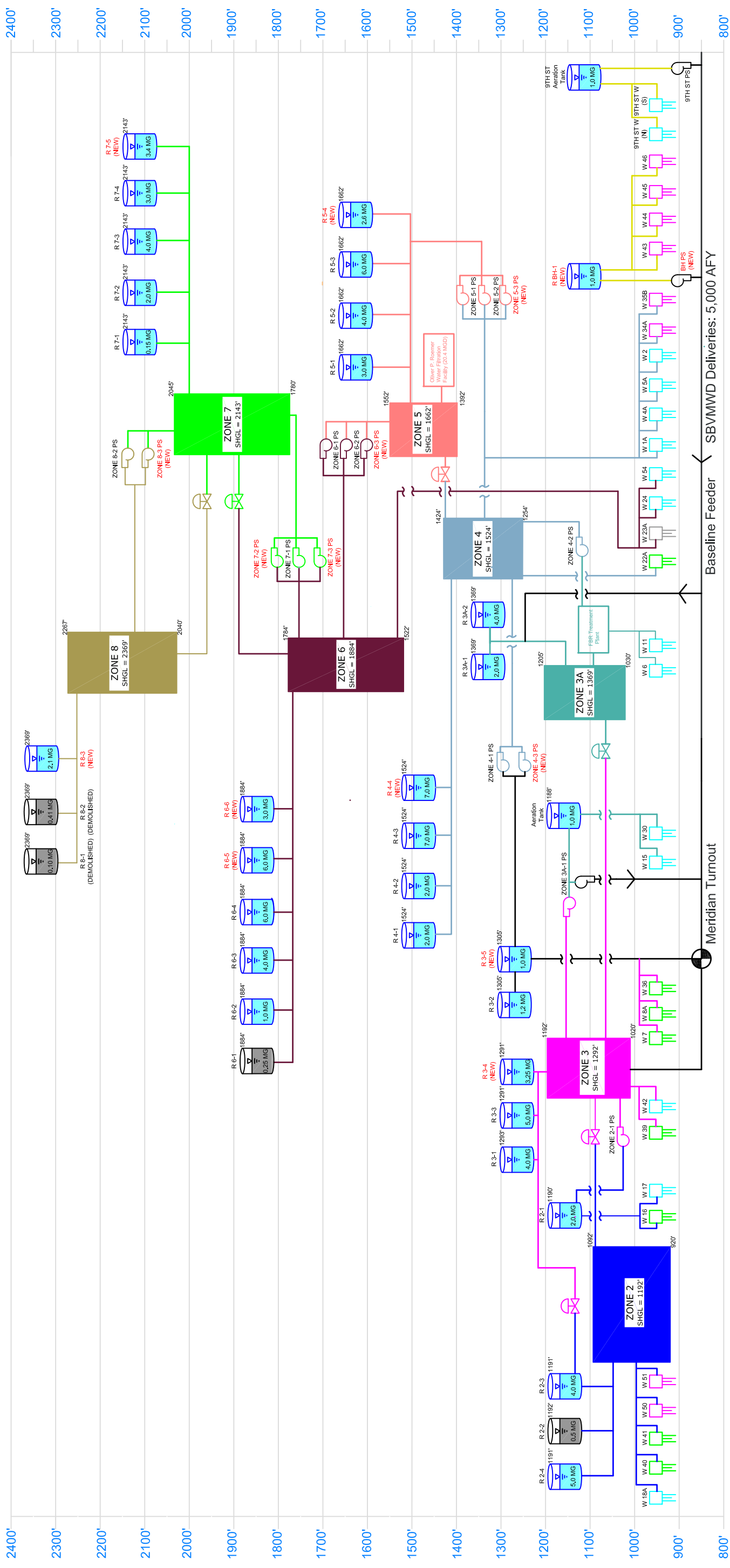
**PRELIMINARY**

# Figure 8.4

Water Facilities Master Plan  
West Valley Water District







## Figure 8.5

### Buildout Hydraulic Profile Schematic

# WATER FACILITIES MASTER PLAN

## WEST VALLEY WATER DISTRICT



**Table 8.3 Capital Improvement Costs - Pipelines**  
Water Facilities Master Plan  
West Valley Water District

Improv. No.	Pressure Zone	Alignment	Limits	Pipeline Improvements		Infrastructure Costs				Baseline Constr. Costs <sup>(B)</sup>	Estimated Const. Costs <sup>1</sup>	Capital Improv. Costs <sup>2,3</sup>	Improvement Horizon	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
				Existing Diameter	New/Parallel/Replace	Diameter	Length	Unit Cost	Infr. Cost						Existing Users	Future Users	Existing Users	Future Users
<b>Pressure Zone 2</b>																		
Z2-P1	2	Bloomington Phase 4	From Locust Ave to Cedar Ave	-	New	24	4,000	-	-	-	2,222,000	Five-Year	Immediate	100%	0%	2,222,000	0	
Z2-P2	2	Bloomington Phase 4	From Locust Ave to Linden Ave	-	New	8	4,075	-	-	-	850,000	Five-Year	Immediate	100%	0%	850,000	0	
Z2-P3	2	Bloomington Phase 5	From Locust Ave to Linden Ave	4, 6	Replace	8	2,625	-	-	-	650,000	Five-Year	Immediate	100%	0%	650,000	0	
Z2-P4	2	Bloomington Phase 3	From Locust Ave to Linden Ave	4, 8	Replace	8	2,625	-	-	-	650,000	Five-Year	Immediate	100%	0%	650,000	0	
Z2-P5	2	Bloomington Phase 3	From Locust Ave to Linden Ave	-	New	8	2,625	-	-	-	400,000	Five-Year	Immediate	100%	0%	400,000	0	
Z2-P6	2	Bloomington Phase 3	From Eleventh St to Eighth St	6	Replace	12	1,275	-	-	-	650,000	Five-Year	Immediate	100%	0%	650,000	0	
Z2-P7	2	Santa Ana Ave	From Linden Ave to Cedar Ave	-	New	12	1,375	200	274,835	275,000	380,000	Five-Year	Immediate	100%	0%	380,000	0	
Z2-P8	2	Santa Ana Ave	From Cedar Ave to Riverside Ave	12	Replace	20	8,250	333	2,748,345	2,749,000	3,794,000	Five-Year	Immediate	100%	0%	3,794,000	0	
Z2-P9	2	Pepper Ave	From approx. 1,200 ft n/o Slover Ave to approx. 300 ft s/o I-10	-	New	24	550	400	219,868	220,000	304,000	Five-Year	Immediate	100%	0%	304,000	0	
Z2-P9C	2	Pepper Ave	From approx. 150' s/o railway to 150' n/o railway (Casing)	-	New	-	400	24	422,400	423,000	585,000	Five-Year	Immediate	100%	0%	585,000	0	
Z2-P10		Pepper Ave, San Bernardino Ave	From approx. 400' n/o the intersection of Valley Blvd and Pepper Ave to the intersection of San Bernardino Ave and Eucalyptus Ave	-	New	24	3,375	400	1,349,188	1,350,000	1,863,000	Buildout	As Development Occurs	0%	100%	0	1,863,000	
Z2-FF1	2	Holly St and Wilson St	From the intersection of Brown Ave and Wilson St to approx 700' n/o Wilson St	-	New	12	1,225	200	244,853	245,000	339,000	Five-Year	Immediate	100%	0%	339,000	0	
<b>Subtotal - Pressure Zone 2</b>											<b>6,315,000</b>	<b>12,687,000</b>				<b>10,824,000</b>	<b>1,863,000</b>	
<b>Pressure Zone 3</b>																		
Z3-P1	3	Future ROW	From planned reservoir 3-4 site to Alder Ave	-	New	24	700	400	279,832	280,000	387,000	Buildout	With Reservoir 3-4	0%	100%	0	387,000	
Z3-P2	3	Future ROW	From Alder Ave to Locust Ave	-	New	24	2,525	400	1,009,392	1,010,000	1,394,000	Buildout	As Development Occurs	0%	100%	0	1,394,000	
Z3-P3	3	Locust Ave, Armstrong Rd	From Jurupa Ave to approx. 2,200' sw/o Eighth St	-	New	12	5,250	200	1,049,368	1,050,000	1,449,000	Buildout	As Development Occurs	0%	100%	0	1,449,000	
Z3-P4	3	Santa Ana Ave	From Alder Ave to Linden Ave	4, 6, 12	Replace	12	5,375	200	1,074,353	1,075,000	1,484,000	Five-Year	Immediate	100%	0%	1,484,000	0	
Z3-P5	3	Santa Ana Ave	From Linden Ave to Cedar Ave	-	New	16	1,250	267	333,133	334,000	462,000	Five-Year	Immediate	100%	0%	462,000	0	
Z3-P6	3	Valley Blvd, s/o Valley Blvd	Generally between Cedar Ave and Larch Ave	2, 4, 6	Replace	8	2,800	133	373,109	374,000	517,000	Five-Year	Immediate	100%	0%	517,000	0	
Z3-P7	3	Generally n/o Valley Blvd	Generally Between Olive St and Spruce Ave	4, 6	Replace	8	5,650	133	752,880	753,000	1,040,000	Five-Year	Immediate	100%	0%	1,040,000	0	
Z3-P8	3	Valley Blvd, s/o Valley Blvd	From approx. 850' w/o Eucalyptus Ave to Eucalyptus Ave	2, 4, 6	Replace	12	875	-	-	-	210,000	Five-Year	Immediate	100%	0%	210,000	0	
<b>Subtotal - Pressure Zone 3</b>											<b>4,876,000</b>	<b>6,943,000</b>				<b>3,713,000</b>	<b>3,230,000</b>	
<b>Pressure Zone 3A</b>																		
Z3A-P1	3	Cactus Ave	From James St to Alru St	-	New	10	325	-	-	-	143,500	Five-Year	Immediate	100%	0%	143,500	0	
<b>Subtotal - Pressure Zone 3A</b>											<b>0</b>	<b>143,500</b>				<b>143,500</b>	<b>0</b>	
<b>Pressure Zone 4</b>																		
Z4-P1	4	Cactus Ave	From Baseline Rd to I-210	18	Parallel	24	4,525	400	1,808,911	1,809,000	2,497,000	Buildout	With PS 4-2 Expansion	0%	100%	0	2,497,000	
Z4-P2	4	Cactus Ave	From Casmalia St to Riverside Ave	18	Parallel	24	3,125	400	1,249,248	1,250,000	1,725,000	Buildout	With PS 4-2 Expansion	0%	100%	0	1,725,000	
Z4-P3	4	Pepper Ave, Highland Ave, Oakdale Ave, Future ROW	From Lord Ranch Facility to reservoir 4-3 site	16	Parallel	30	14,600	500	7,295,608	7,296,000	10,070,000	Buildout	With Reservoir 4-4	0%	100%	0	10,070,000	
Z4-P4	4	Future ROW	From Well 35C to Lytle Creek Ranch Development	-	New	12	700	200	139,916	140,000	194,000	Buildout	With Well 35C	0%	100%	0	194,000	
Z4-P5	4	Future ROW	From Well 5A to Lytle Creek Ranch Development	-	New	12	950	200	189,886	190,000	263,000	Buildout	As Development Occurs	0%	100%	0	263,000	
Z4-P6	4	Future ROW	From Well 4A to Lytle Creek Ranch Development	-	New	12	850	200	169,898	170,000	235,000	Buildout	As Development Occurs	0%	100%	0	235,000	
Z4-P7	4	Future ROW	Lytle Creek Ranch Development	-	New	18	3,950	300	1,184,287	1,185,000	1,636,000	Buildout	As Development Occurs	0%	100%	0	1,636,000	
Z4-P8	4	Future ROW	From Sycamore Ave to Lytle Creek Ranch Development	-	New	20	1,600	333	533,012	534,000	738,000	Buildout	As Development Occurs	0%	100%	0	738,000	
Z4-P9	4	Future ROW	Lytle Creek Ranch Development	-	New	12	425	200	84,949	85,000	118,000	Buildout	As Development Occurs	0%	100%	0	118,000	
Z4-P10	4	Future ROW	From Well 34B to Lytle Creek Ranch Development	-	New	12	800	200	159,904	160,000	221,000	Buildout	With Well 34B	0%	100%	0	221,000	
Z4-P11	4	Future ROW	Lytle Creek Ranch Development	-	New	24	1,275	400	509,693	510,000	704,000	Buildout	As Development Occurs	0%	100%	0	704,000	
Z4-P12	4	Future ROW	Lytle Creek Ranch Development	-	New	12	75	200	14,991	15,000	21,000	Buildout	As Development Occurs	0%	100%	0	21,000	
Z4-P13	4	Future ROW	Lytle Creek Ranch Development	-	New	24	125	400	49,970	50,000	69,000	Buildout	As Development Occurs	0%	100%	0	69,000	
Z4-P14	4	Future ROW	Lytle Creek Ranch Development	-	New	24	1,800	400	719,567	720,000	994,000	Buildout	As Development Occurs	0%	100%	0	994,000	

PRELIMINARY



**Table 8.3 Capital Improvement Costs - Pipelines**  
Water Facilities Master Plan  
West Valley Water District

Improv. No.	Pressure Zone	Alignment	Limits	Pipeline Improvements		Infrastructure Costs			Baseline Constr. Costs <sup>(B)</sup>	Estimated Const. Costs <sup>(C)</sup>	Capital Improv. Costs <sup>(D)</sup>	Improvement Horizon	Construction Trigger	Suggested Cost Allocation		Cost Sharing	
				Existing Diameter (in)	New/Parallel/Replace	Diameter (in)	Length (ft)	Unit Cost (\$)						Infr. Cost (\$)	Existing Users	Future Users	Existing Users
Z4-P15	4	Future ROW	Lytle Creek Ranch Development	-	New	18	1,550	300	464,720	465,000	558,000	642,000	As Development Occurs	0%	100%	0	642,000
Z4-P16	4	Future ROW	Lytle Creek Ranch Development	-	New	24	2,125	400	849,489	850,000	1,020,000	1,173,000	As Development Occurs	0%	100%	0	1,173,000
<b>Subtotal - Pressure Zone 4</b>										<b>15,429,000</b>	<b>18,516,000</b>	<b>21,300,000</b>			<b>0</b>	<b>21,300,000</b>	
<b>Pressure Zone 5</b>																	
Z5-P1	5	Future ROW	Lytle Creek Ranch Development	-	New	12	6,900	200	1,379,170	1,380,000	1,656,000	1,905,000	As Development Occurs	0%	100%	0	1,905,000
Z5-P2	5	Future ROW	Lytle Creek Ranch Development	-	New	12	4,975	200	994,401	995,000	1,194,000	1,374,000	As Development Occurs	0%	100%	0	1,374,000
Z5-P3	5	Future ROW	Lytle Creek Ranch Development	-	New	12	1,925	200	384,768	385,000	462,000	532,000	As Development Occurs	0%	100%	0	532,000
Z5-P4	5	Future ROW	Lytle Creek Ranch Development	-	New	18	1,275	300	382,270	383,000	460,000	529,000	As Development Occurs	0%	100%	0	529,000
Z5-P5	5	Future ROW	Lytle Creek Ranch Development	-	New	16	5,400	267	1,439,134	1,440,000	1,728,000	1,988,000	As Development Occurs	0%	100%	0	1,988,000
Z5-P6	5	Future ROW	Lytle Creek Ranch Development	-	New	24	1,000	400	399,759	400,000	480,000	552,000	As Development Occurs	0%	100%	0	552,000
<b>Subtotal - Pressure Zone 5</b>										<b>4,983,000</b>	<b>5,980,000</b>	<b>6,880,000</b>			<b>0</b>	<b>6,880,000</b>	
<b>Pressure Zone 6</b>																	
Z6-P1	6	Persimmon St and Summit Ave	Generally between Locust Ave and Cedar Ave	-	New	12	4,375	200	874,474	875,000	1,050,000	1,208,000	As Funding is Available	100%	0%	1,208,000	0
Z6-P2	6	Persimmon St and Summit Ave	Generally between Locust Ave and Cedar Ave	4, 6	Replace	8	475	133	63,295	64,000	77,000	89,000	As Funding is Available	100%	0%	89,000	0
Z6-P3	6	Future ROW	Lytle Creek Ranch Development	-	New	12	5,275	200	1,054,365	1,055,000	1,266,000	1,456,000	As Development Occurs	0%	100%	0	1,456,000
Z6-P4	6	Future ROW	Lytle Creek Ranch Development	-	New	24	2,175	400	869,477	870,000	1,044,000	1,201,000	As Development Occurs	0%	100%	0	1,201,000
Z6-P5	6	Future ROW	Lytle Creek Ranch Development	-	New	20	2,625	333	874,474	875,000	1,050,000	1,208,000	As Development Occurs	0%	100%	0	1,208,000
Z6-P6	6	Future ROW	Lytle Creek Ranch Development	-	New	12	1,050	200	209,874	210,000	252,000	290,000	As Development Occurs	0%	100%	0	290,000
Z6-P7	6	Future ROW	Lytle Creek Ranch Development	-	New	16	475	267	126,590	127,000	153,000	176,000	As Development Occurs	0%	100%	0	176,000
Z6-P8	6	Future ROW	Lytle Creek Ranch Development	-	New	12	850	200	169,898	170,000	204,000	235,000	As Development Occurs	0%	100%	0	235,000
Z6-P9	6	Future ROW	Lytle Creek Ranch Development	-	New	12	1,650	200	329,801	330,000	396,000	456,000	As Development Occurs	0%	100%	0	456,000
Z6-P10	6	Future ROW	Lytle Creek Ranch Development	-	New	18	3,025	300	906,954	907,000	1,089,000	1,253,000	As Development Occurs	0%	100%	0	1,253,000
Z6-P11	6	Future ROW	Lytle Creek Ranch Development	-	New	24	550	400	219,868	220,000	264,000	304,000	As Development Occurs	0%	100%	0	304,000
Z6-P12	6	Future ROW	Lytle Creek Ranch Development	-	New	12	875	200	174,895	175,000	210,000	242,000	As Development Occurs	0%	100%	0	242,000
Z6-P13	6	Sunrise Dr	From Sierra Ave to Citrus Ave	-	New	12	5,325	200	1,064,359	1,065,000	1,278,000	1,470,000	As Development Occurs	0%	100%	0	1,470,000
Z6-P14	6	Cypress Ave	From Sunrise Ave to Casa Grande Ave	-	New	12	975	200	194,883	195,000	234,000	270,000	As Development Occurs	0%	100%	0	270,000
Z6-P15	6	Citrus Ave	From planned reservoir 6-6 site to approx. 1,000' s/o Duncan Canyon Rd	-	New	24	4,350	400	1,738,953	1,739,000	2,087,000	2,401,000	With Reservoir 6-6	0%	100%	0	2,401,000
Z6-P16	6	Future ROW	From Knox Ave to Citrus Ave	-	New	12	3,325	200	664,600	665,000	798,000	918,000	As Development Occurs	0%	100%	0	918,000
<b>Subtotal - Pressure Zone 6</b>										<b>9,542,000</b>	<b>11,452,000</b>	<b>13,177,000</b>			<b>1,297,000</b>	<b>11,880,000</b>	
<b>Pressure Zone 7</b>																	
Z7-P1	7	Alder Ave	From Via Bello Dr to Lytle Creek Ranch Development	-	New	12	5,750	200	1,149,308	1,150,000	1,380,000	1,587,000	As Development Occurs	0%	100%	0	1,587,000
Z7-P2	7	Future ROW	Lytle Creek Ranch Development	-	New	12	775	200	154,907	155,000	186,000	214,000	As Development Occurs	0%	100%	0	214,000
Z7-P3	7	Future ROW	Lytle Creek Ranch Development	-	New	18	1,975	300	592,144	593,000	712,000	819,000	As Development Occurs	0%	100%	0	819,000
Z7-P4	7	Future ROW	Lytle Creek Ranch Development	-	New	16	3,275	267	872,808	873,000	1,048,000	1,206,000	As Development Occurs	0%	100%	0	1,206,000
Z7-P5	7	Future ROW	Lytle Creek Ranch Development	-	New	12	1,275	200	254,847	255,000	306,000	352,000	As Development Occurs	0%	100%	0	352,000
Z7-P6	7	Future ROW	Lytle Creek Ranch Development	-	New	12	1,025	200	204,877	205,000	246,000	283,000	As Development Occurs	0%	100%	0	283,000
Z7-P7	7	Future ROW	Lytle Creek Ranch Development	-	New	12	1,500	200	299,819	300,000	360,000	414,000	As Development Occurs	0%	100%	0	414,000
Z7-P8	7	Sierra Ave	From Riverside Ave to Segovia Ln	-	New	12	2,250	200	449,729	450,000	540,000	621,000	As Development Occurs	0%	100%	0	621,000
Z7-P9	7	Future ROW	From the intersection of Riverside Ave and Sierra Ave to the intersection of Cypress Ave	-	New	18	3,625	300	1,086,846	1,087,000	1,305,000	1,501,000	As Development Occurs	0%	100%	0	1,501,000
Z7-P10	7	Segovia Ln	From Sierra Ave to Citrus Ave	-	New	18	5,950	300	1,783,926	1,784,000	2,141,000	2,463,000	As Development Occurs	0%	100%	0	2,463,000
Z7-P11	7	Cypress Ave	From Segovia Ln to Terra Vista Dr	-	New	12	1,225	200	244,853	245,000	294,000	339,000	As Development Occurs	0%	100%	0	339,000
Z7-P12	7	Terra Vista Dr	From Sierra Ave to Citrus Ave	-	New	12	5,225	200	1,044,371	1,045,000	1,254,000	1,443,000	As Development Occurs	0%	100%	0	1,443,000
Z7-P13	7	Cypress Ave	From Terra Vista Dr to Sunrise Dr	-	New	12	2,650	200	529,681	530,000	636,000	732,000	As Development Occurs	0%	100%	0	732,000
Z7-P14	7	Citrus Ave	From Terra Vista Dr to Duncan Canyon Rd	-	New	16	1,350	267	359,783	360,000	432,000	497,000	As Development Occurs	0%	100%	0	497,000
Z7-P15	7	Sunrise Dr	From Sierra Ave to Citrus Ave	-	New	12	5,625	200	1,124,323	1,125,000	1,350,000	1,553,000	As Development Occurs	0%	100%	0	1,553,000
Z7-P16	7	Future ROW	From Citrus Ave to Lytle Creek Rd	-	New	18	600	300	179,892	180,000	216,000	249,000	As Development Occurs	0%	100%	0	249,000
Z7-P16C	7	Future ROW	From Citrus Ave to Lytle Creek Rd (Casing)	-	New	-	600	24	547,200	548,000	658,000	757,000	As Development Occurs	0%	100%	0	757,000
Z7-P17	7	Coyote Canyon Rd	From Lytle Creek Rd to Hawk Ridge Rd	-	New	12	4,150	200	829,501	830,000	996,000	1,146,000	As Development Occurs	0%	100%	0	1,146,000

PRELIMINARY



**Table 8.4 Capital Improvement Costs - Storage Reservoirs, Pump Stations, Pressure Reducing Valves**

Water Facilities Master Plan  
West Valley Water District

Improv. No.	Pressure Zone	Location	New/ Replace	Infrastructure Costs		Baseline Constr. Costs (\$)	Estimated Const. Costs <sup>1</sup> (\$)	Capital Improv. Costs <sup>2,3</sup> (\$)	Improvement Horizon	Construction Trigger		Suggested Cost Allocation		Cost Sharing	
				Recommended Capacity (MG)	Infr. Cost (\$)					(EDU)	Existing Users	Future Users	Existing Users	Future Users	
<b>Storage Reservoir Improvements</b>															
<b>Z3-R3-4</b>	3	Approx. 1,100' sw/o the intersection of Jurupa Ave and Alder Ave	New	3.25	4,485,000	4,485,000	5,382,000	6,190,000	Buildout	2,200 EDUs	0%	100%	0	6,190,000	
<b>Z4-R4-4</b>	4	Reservoir 4-3 site	New	7.00	9,660,000	9,660,000	11,592,000	13,331,000	Buildout	4,900 EDUs	0%	100%	0	13,331,000	
<b>Z5-R5-4</b>	5	Lytle Creek Ranch Development, approx. 1,000' ne/o reservoir 5-1 site	New	2.60	3,588,000	3,588,000	4,306,000	4,952,000	Buildout	10,900 EDUs	0%	100%	0	4,952,000	
<b>Z6-R6-5</b>	6	Reservoir 6-2 site	New	6.00	8,280,000	8,280,000	9,936,000	11,427,000	Buildout	2,900 EDUs	0%	100%	0	11,427,000	
<b>Z6-R6-6</b>	6	Approx. 1,100' e/o the intersection of Citrus Avenue and Segovia Ave	New	3.00	4,140,000	4,140,000	4,968,000	5,714,000	Buildout	As Development Occurs	0%	100%	0	5,714,000	
<b>Z7-R7-5</b>	7	Intersection of Clearwater Pkwy and Glen Helen Pkwy	New	3.40	4,692,000	4,692,000	5,631,000	6,476,000	Buildout	6,300 EDUs	0%	100%	0	6,476,000	
<b>Z8-R8-3</b>	8	Existing Z8 Tank Site	Replace	2.10	-	-	-	4,080,000	Five-Year	Immediate	10%	90%	408,000	3,672,000	
<b>BH-AER</b>	-		New	1.00	1,380,000	1,380,000	1,656,000	1,905,000	Buildout	With Well 43	0%	100%	0	1,905,000	
<b>LR-R3-5</b>	-	Existing Lord Ranch Facility	New	1.00	-	-	-	1,905,000	Five-Year	Immediate	0%	100%	0	1,905,000	
				<b>Total Reservoir Improvement Costs</b>		<b>36,225,000</b>	<b>43,471,000</b>	<b>55,980,000</b>					<b>408,000</b>	<b>55,572,000</b>	
<b>Pump Station Improvements</b>															
<b>Z3-PS2-1</b>	3	Existing Pump Station 2-1 site	New	1,500 (gpm)	-	-	-	320,000	Buildout	With Well 16	100%	0%	320,000	0	
<b>Z4-PS4-2</b>	4	Existing Pump Station 4-2 site	New	9,600	3,403,097	3,404,000	4,085,000	4,698,000	Buildout	With Well 43	0%	100%	0	4,698,000	
<b>Z4-PS4-3</b>	4	Lord Ranch Facility	New	11,920	-	-	-	3,000,000	Five-Year	Immediate	0%	100%	0	3,000,000	
<b>Z5-PS5-3</b>	5	Lytle Creek Ranch development, approx. 2,200' ne/o reservoir 4-3 site	New	8,000	2,963,680	2,964,000	3,557,000	4,091,000	Buildout	As Development Occurs	0%	100%	0	4,091,000	
<b>Z6-PS6-3</b>	6	Lytle Creek ranch development, approx. 1,000' ne/o reservoir 5-1 site	New	5,200	2,137,782	2,138,000	2,566,000	2,951,000	Buildout	As Development Occurs	0%	100%	0	2,951,000	
<b>Z7-PS7-2</b>	7	Existing Pump Station 7-1 site	New	6,000	2,382,814	2,383,000	2,860,000	3,289,000	Five-Year	Immediate	0%	100%	0	3,289,000	
<b>Z7-PS7-3</b>	7	Lytle Creek Ranch development, approx. 1,500' ne/o reservoir 6-2 site	New	5,250	2,153,351	2,154,000	2,585,000	2,973,000	Buildout	As Development Occurs	0%	100%	0	2,973,000	
<b>Z8-PS8-3</b>	8	Intersection of Clearwater Pkwy and Glen Helen Pkwy	New	4,890	2,040,427	2,041,000	2,450,000	2,818,000	Buildout	As Development Occurs	0%	100%	0	2,818,000	
<b>BH-PS</b>	-	Intersection of 16th St and Pennsylvania Ave	New	17,500	5,365,545	5,366,000	6,440,000	7,406,000	Buildout	With Well 43	0%	100%	0	7,406,000	
				<b>Total Pump Station Improvement Costs</b>		<b>20,450,000</b>	<b>24,543,000</b>	<b>31,546,000</b>					<b>320,000</b>	<b>31,226,000</b>	
<b>Pressure Reducing Valve Improvements</b>															
<b>Z6-PRV1</b>	7B-6	Sierra Ave, approx. 1,000' n/o Casa Grande Dr	New		75,000	75,000	90,000	104,000	Five-Year	As Development Occurs	0%	100%	0	104,000	
<b>Z6-PRV2</b>	7B-6	Coyote Canyon Rd, approx. 300' ne/o Hawk Ridge Ave	New		75,000	75,000	90,000	104,000	Five-Year	As Development Occurs	0%	100%	0	104,000	
<b>Z7-PRV1</b>	7-7B	Lytle Creek Ranch Development	New		75,000	75,000	90,000	104,000	Five-Year	As Development Occurs	0%	100%	0	104,000	
<b>Z7-PRV2</b>	7-7B	Intersection of Terra Vista Dr and Cypress Ave	New		75,000	75,000	90,000	104,000	Buildout	As Development Occurs	0%	100%	0	104,000	
<b>Z7-PRV3</b>	7-7B	Intersection of Terra Vista Dr and Citrus Ave	New		75,000	75,000	90,000	104,000	Buildout	As Development Occurs	0%	100%	0	104,000	

PRELIMINARY

**Table 8.4 Capital Improvement Costs - Storage Reservoirs, Pump Stations, Pressure Reducing Valves**

Water Facilities Master Plan  
West Valley Water District

Improv. No.	Pressure Zone	Location	New/ Replace	Infrastructure Costs		Baseline Constr. Costs (\$)	Estimated Const. Costs <sup>1</sup> (\$)	Capital Improv. Costs <sup>2,3</sup> (\$)	Improvement Horizon	Construction Trigger (EDU)	Suggested Cost Allocation		Cost Sharing	
				Recommended Capacity	Infr. Cost (\$)						Existing Users	Future Users	Existing Users	Future Users
Z7-PRV4	7-7B	Lytle Creek Rd, nw/o Monarch Hills Development	New		75,000	75,000	90,000	104,000	Five-Year	Immediate	0%	100%	0	104,000
<b>Total Pressure Reducing Valve Improvement Costs</b>						<b>450,000</b>	<b>540,000</b>	<b>624,000</b>					<b>0</b>	<b>624,000</b>
<b>Total Improvement Costs</b>						<b>36,225,000</b>	<b>43,471,000</b>	<b>55,980,000</b>					<b>408,000</b>	<b>55,572,000</b>
						<b>20,450,000</b>	<b>24,543,000</b>	<b>31,546,000</b>					<b>320,000</b>	<b>31,226,000</b>
						<b>450,000</b>	<b>540,000</b>	<b>624,000</b>					<b>0</b>	<b>624,000</b>
						<b>57,125,000</b>	<b>68,554,000</b>	<b>88,150,000</b>					<b>728,000</b>	<b>87,422,000</b>



Notes:

1. Baseline construction costs plus 20% to account for unforeseen events and unknown conditions.
2. Estimated construction costs plus 15% to cover other costs including: engineering design, project administration (developer and District staff), construction management and inspection, and legal costs.
3. Costs for improvements shown with only Capital Improvement Cost are based on information provided by WVWD staff.

PRELIMINARY  
3/7/2019

**Table 8.5 Capital Improvement Costs - OPR WFF Expansion**

Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

Item No.	Expansion Item	Capital Improvement Cost (\$)
1	Civil Costs	15,719,030
2	Raw Water Control Structures	1,376,530
3	Microfiltration	20,160,000
4	UV	3,216,401
5	GAC Contactors	18,276,187
6	Chlorine Contact	525,960
7	Equalization Storage	1,722,652
8	Membrane Pumping	1,552,386
9	Chemicals	680,507
10	Influent Blending Ponds	2,174,933
11	Sludge Ponds	3,342,534
12	Administration Building (7,000 s.f.)	3,000,000
<b>Total Improvement Cost</b>		<b>71,747,120</b>



2/19/2019

Notes:

- Capital Improvement costs extracted from opinion of probable costs prepared by Carollo Engineers March 19, 2019 and provided by District staff.
- Estimate is based on a number of assumptions and limited information, approximate accuracy is +50% to -30%.



**Table 8.6 Capital Improvement Costs - Supply**

Water Facilities Master Plan  
West Valley Water District

Improv. No.	New/ Rehabilitate	Infrastructure Costs				Total Infr. Cost (\$)	Baseline Constr. Costs (\$)	Estimated Const. Costs <sup>1</sup> (\$)	Capital Improv. Costs <sup>2</sup> (\$)	Improvement Phase	Construction Trigger (year)	Suggested Cost Allocation		Cost Sharing	
		Planned Capacity (gpm)	Well Construction Cost	Treatment Cost								Existing Users	Future Users	Existing Users	Future Users
<b>Groundwater Supply Improvements<sup>3,4</sup></b>															
W54	Rehabilitate	1,000	-	150,000	150,000	-	-	150,000	Five-Year	2019	80%	20%	120,000	30,000	
W18A	Rehabilitate	2,700	-	7,668,839	7,668,839	-	-	7,669,000	Five-Year	2019	80%	20%	6,135,200	1,533,800	
W42	Rehabilitate	2,200	-	9,246,213	9,246,213	-	-	9,247,000	Five-Year	2019	80%	20%	7,397,600	1,849,400	
W39	Rehabilitate	4,000	-	9,334,214	9,334,214	-	-	9,335,000	Five-Year	2019	80%	20%	7,468,000	1,867,000	
W41	Rehabilitate	2,200	-	550,000	550,000	-	-	550,000	Five-Year	2020	80%	20%	440,000	110,000	
W50	New	1,500	-	7,208,559	7,208,559	-	-	7,209,000	Five-Year	2020	80%	20%	5,767,200	1,441,800	
W52	New	2,000	-	8,690,777	8,690,777	-	-	8,691,000	Five-Year	2021	80%	20%	6,952,800	1,738,200	
W16	Rehabilitate	1,500	-	5,716,015	5,716,015	-	-	5,717,000	Five-Year	2021	80%	20%	4,573,600	1,143,400	
W29A	New	1,500	7,208,559	-	7,208,559	-	-	7,209,000	Five-Year	2022	80%	20%	5,767,200	1,441,800	
W40	Rehabilitate	1,500	-	7,208,559	7,208,559	-	-	7,209,000	Five-Year	2022	80%	20%	5,767,200	1,441,800	
W43	New	3,500	3,000,000	-	3,000,000	-	-	3,000,000	Five-Year	2023	0%	100%	0	3,000,000	
W44	New	3,500	3,000,000	-	3,000,000	-	-	3,000,000	Five-Year	2023	0%	100%	0	3,000,000	
W45	New	3,500	3,000,000	-	3,000,000	-	-	3,000,000	Five-Year	2024	0%	100%	0	3,000,000	
W46	New	3,500	3,000,000	-	3,000,000	-	-	3,000,000	Five-Year	2024	0%	100%	0	3,000,000	
W7	Rehabilitate	2,100	-	50,000	50,000	-	-	50,000	Buildout	2029	0%	100%	0	50,000	
W8A	Rehabilitate	2,400	-	3,288,359	3,288,359	-	-	3,289,000	Buildout	2029	0%	100%	0	3,289,000	
W36	Rehabilitate	2,700	-	3,550,000	3,550,000	-	-	3,550,000	Buildout	2030	0%	100%	0	3,550,000	
W51	New	3,000	-	11,311,441	11,311,441	-	-	11,312,000	Buildout	2036	0%	100%	0	11,312,000	
W34B	New	2,000	-	2,920,864	2,920,864	-	-	2,921,000	Buildout	2040	0%	100%	0	2,921,000	
W35C	New	2,000	-	2,920,864	2,920,864	-	-	2,921,000	Buildout	2040	0%	100%	0	2,921,000	
W22A	Rehabilitate	1,500	-	5,716,015	5,716,015	-	-	5,717,000	Buildout	2042	0%	100%	0	5,717,000	
<b>Subtotal - Groundwater Supply Improvements</b>						<b>104,739,278</b>	<b>0</b>	<b>104,746,000</b>					<b>50,388,800</b>	<b>54,357,200</b>	
<b>Surface Water Supply Improvements<sup>5</sup></b>															
OPR WFF	New	16.0 mgd expansion	-	-	-	-	-	71,747,120	Five-Year	2022	0%	100%	0	71,747,120	
<b>Subtotal - Surface Water Supply Improvements</b>						<b>0</b>	<b>0</b>	<b>71,747,120</b>					<b>0</b>	<b>71,747,120</b>	
<b>Total Improvement Cost</b>													<b>50,388,800</b>	<b>126,104,320</b>	
								<b>104,746,000</b>					<b>50,388,800</b>	<b>54,357,200</b>	
								<b>71,747,120</b>					<b>0</b>	<b>71,747,120</b>	
								<b>176,493,120</b>					<b>50,388,800</b>	<b>126,104,320</b>	



Notes:

1. Baseline construction costs plus 25% to account for unforeseen events and unknown conditions.
2. Estimated construction costs plus 22% to cover other costs including: engineering design, project administration (developer and District staff), construction management and inspection, and legal costs.
3. Costs and contingencies shown provided by Kleinfelder, Inc.
4. Costs shown for new wells include both construction costs and costs for any potential treatment identified.
5. Costs shown prepared by Carollo Engineers and provided by District staff April 1, 2019.

4/5/2019

**Table 8.7 5-year Improvement Phasing**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

CIP ID	Project Name	Project Description	Fiscal Year Improvement Phasing													
			FY 2018/19		FY 2019/20		FY 2020/21		FY 2021/22		FY 2022/23		FY 2023/24		Total Improvement Cost	
			Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)
<b>Pipeline Improvements</b>																
<b>Capacity Improvements</b>																
Z2-P1	Bloomington Pipeline Replacement (Phase 4)	Construct new 24-inch transmission main in Eighth St							2,222,000						2,222,000	0
Z2-P2	Bloomington Pipeline Replacement (Phase 4)	Construct new 8-inch pipelines in Eighth St							850,000						850,000	0
Z2-P3	Bloomington Pipeline Replacement (Phase 5)	Replace existing 4-inch and 6-inch pipelines with new 8-inch pipelines in Ninth St											650,000		650,000	0
Z2-P4	Bloomington Pipeline Replacement (Phase 3)	Replace existing 4-inch and 8-inch pipelines with new 8-inch pipelines in Tenth St	650,000												650,000	0
Z2-P5	Bloomington Pipeline Replacement (Phase 3)	Construct new 8-inch pipelines in Eleventh St	400,000												400,000	0
Z2-P6	Bloomington Pipeline Replacement (Phase 3)	Replace existing 6-inch pipelines with new 12-inch pipelines in Maple St	650,000												650,000	0
Z2-P7	Zone 2 Santa Ana Transmission	Construct new 12-inch transmission main on Santa Ana Ave			380,000										380,000	0
Z2-P8	Zone 2 Santa Ana Transmission	Replace existing 12-inch pipelines with new 20-inch transmission main on Santa Ana Ave								3,794,000					3,794,000	0
Z2-P9	Zone 2 I-10 Crossing	Construct 24-inch transmission main crossing I-210			304,000										304,000	0
Z2-P9C	Zone 2 I-10 Crossing	Casing for pipeline crossing I-210			585,000										585,000	0
Z3-P4	Zone 3 Santa Ana Transmission	Replace existing 4-inch, 6-inch, and 12-inch pipelines with new 12-inch pipeline in Santa Ana Ave							1,484,000						1,484,000	0
Z3-P5	Zone 3 Santa Ana Transmission	Construct new 16-inch transmission main in Santa Ana Ave			462,000										462,000	0
Z3-P6	Valley Blvd Pipeline Replacements	Replace existing 2-inch, 4-inch, and 6-inch pipelines with 8-inch pipelines								517,000					517,000	0
Z3-P7	Valley Blvd Pipeline Replacements	Replace existing 4-inch and 6-inch pipelines with 8-inch pipelines								1,040,000					1,040,000	0
Z3-P8	Zone 3 Hydraulic Reliability	Construct a new 12-inch pipeline in Valley Blvd	50,000		160,000										210,000	0
Z3A-P1	Zone 3A Hydraulic Reliability	Construct a new 10-inch pipeline in Cactus Ave			35,000				108,500						143,500	0
Z7-P10	Zone 7 Transmission	Construct a new 18-inch transmission main in Segovia Ln from Sierra Ave to Citrus Ave													0	2,463,000
Z7-P16	Zone 7 Transmission	Construct a new 18-inch transmission main within future ROW from Citrus Ave to Lytle Creek Rd (includes casing for 15 crossing)													0	1,006,000
BH-P1	Bunker Hill Well Field Transmission	From planned wells 43, 44, 45, and 46 to the Bunker Hill aeration tank													0	840,000
BH-P2	Bunker Hill Well Field Transmission	From Bunker Hill aeration tank to existing Pump Station 3A								5,277,000					0	5,277,000
		<b>Subtotal - Capacity Improvements</b>	1,750,000	0	1,766,000	6,117,000	7,883,000	4,664,500	4,664,500	6,001,000	6,001,000	0	0	3,469,000	14,341,500	9,586,000
			1,750,000	160,000	160,000	160,000	160,000								23,927,500	
<b>Reservoir Improvements</b>																
Z8-R8-3	Zone 8 Reservoir Replacement	Replace existing Zone 8 storage reservoir with new 2.1 MG reservoir	8,000	72,000	400,000	3,600,000									408,000	3,672,000
LR-R3-5	Lord Ranch Aeration Tank	Construct a new 1.0 MG aeration reservoir at Lord Ranch Facility		1,905,000											0	1,905,000
BH-AER	Bunker Hill Aeration Tank	Construct a new aeration tank at the Bunker Hill supply location			0	1,905,000									0	1,905,000
		<b>Subtotal - Reservoir Improvements</b>	8,000	1,977,000	400,000	3,600,000	4,000,000	0	0	1,905,000	1,905,000	0	0	0	408,000	7,482,000
			1,985,000	4,000,000	4,000,000	4,000,000									7,890,000	

**Table 8.7 5-year Improvement Phasing**  
Water Facilities Master Plan  
West Valley Water District

PRELIMINARY

CIP ID	Project Name	Project Description	Fiscal Year Improvement Phasing											
			FY 2018/19	FY 2019/20	FY 2020/21	FY 2021/22	FY 2022/23	FY 2023/24	Total Improvement Cost					
			Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)
<b>Pump Station Improvements</b>														
Z4-PS4-3	Lord Ranch Pump Station	Construct new Pressure Zone 4 pump station at Lord Ranch Facility	0	3,000,000	0	0	0	0	0	0	0	0	0	3,000,000
Z7-PS7-2	New Zone 7 Pump Station	Construct a new pump station adjacent to existing PS 7-1	0	4,091,000	0	0	0	0	0	0	0	0	0	4,091,000
BH-PS	New Bunker Hill supply Pump Station	Construct a new pump station at the Bunker Hill supply location	0	7,406,000	0	0	0	0	0	0	0	0	0	7,406,000
<b>Subtotal - Pump Station Improvements</b>			0	11,497,000	0	0	0	0	0	0	0	0	0	11,497,000
<b>Pressure Reducing Valves Improvements</b>														
Z6-PRV1	Zone 6 PRV	Construct new pressure reducing station on Sierra Ave	0	104,000	0	0	0	0	0	0	0	0	0	104,000
Z6-PRV2	Zone 6 PRV	Construct new pressure reducing station on Coyote Canyon Rd	0	104,000	0	0	0	0	0	0	0	0	0	104,000
Z7-PRV1	Zone 7 PRV	Construct new pressure reducing station within planned Lytle Creek Ranch development	0	104,000	0	0	0	0	0	0	0	0	0	104,000
Z7-PRV4	Zone 7 PRV	Construct new pressure reducing station on Lytle Creek Rd, northwest of planned Monarch Hills Development	0	104,000	0	0	0	0	0	0	0	0	0	104,000
<b>Subtotal - Pressure Reducing Valves Improvements</b>			0	416,000	0	0	0	0	0	0	0	0	0	416,000
<b>Supply Improvements</b>														
W41	Well 41 Rehabilitation	Implement ion-exchange treatment for nitrate	440,000	110,000	0	0	0	0	0	0	0	0	440,000	110,000
W39	Well 39 Rehabilitation	Existing well drilled but not equipped	0	0	7,468,000	1,867,000	0	0	0	0	0	0	7,468,000	1,867,000
W7	Well 7 Rehabilitation	Existing well blind flanged	0	0	0	50,000	0	0	0	0	0	0	0	50,000
W8A	Well 8A Rehabilitation	Implement arsenic removal	0	0	0	3,289,000	0	0	0	0	0	0	0	3,289,000
W36	Well 36 Rehabilitation	Implement arsenic removal	0	0	0	0	0	3,550,000	0	0	0	0	0	3,550,000
W18A	Well 18A Rehabilitation	Implement ion-exchange treatment for nitrate	6,135,200	1,533,800	6,135,200	1,533,800	0	0	0	0	0	6,135,200	1,533,800	
OPR WFF		Design and Construct OPR WFF expansion	0	500,000	0	71,747,120	0	0	0	0	0	0	0	72,247,120
W43		Construct new well	0	0	0	3,000,000	0	0	0	0	0	0	0	3,000,000
W44		Construct new well	0	0	0	0	3,000,000	0	0	0	0	0	0	3,000,000
W45		Construct new well	0	0	0	0	0	3,000,000	0	0	0	0	0	3,000,000
W46		Construct new well	0	0	0	0	0	0	3,000,000	0	0	0	0	3,000,000
<b>Subtotal - Supply Improvements</b>			440,000	610,000	13,603,200	75,147,920	0	3,000,000	0	6,550,000	0	14,043,200	94,646,920	
			1,050,000	1,050,000	88,751,120	88,751,120	6,339,000	3,000,000	6,550,000	3,000,000	3,000,000	108,690,120	108,690,120	
<b>Other Currently Planned Projects</b>														
	Property Acquisition for Reservoir R3-4 (1.5 acres)	Purchase land for future reservoir R3-4	0	0	0	523,000	0	0	0	0	0	0	0	523,000
	Property Acquisition for Reservoir R6-6 (1.5 acres)	Purchase land for future reservoir R6-6	0	0	0	0	523,000	0	0	0	0	0	0	523,000
	Property Acquisition for Bunker Hill Supply	Purchase land for future Bunker Hill wells, pump station, and aeration reservoir	0	1,300,000	0	0	0	0	0	0	0	0	0	1,300,000
R7-5	Reservoir Site Investigation	Conduct site investigation for future reservoir R7-5	0	59,000	0	59,000	0	0	0	0	0	0	0	59,000
<b>Grading, Fencing, and Paving at Lord Ranch Facility</b>			0	0	700,000	0	0	0	0	0	0	0	700,000	0

**Table 8.7 5-year Improvement Phasing**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

CIP ID	Project Name	Project Description	Fiscal Year Improvement Phasing														
			FY 2018/19		FY 2019/20		FY 2020/21		FY 2021/22		FY 2022/23		FY 2023/24		Total Improvement Cost		
			Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	Existing Users (\$)	Future Users (\$)	
	Sierra Ave, Developer Pipeline Capacity Increase	Increase size of development required pipe to accommodate additional future development	120,000												0	120,000	
	Cedar Pl, Developer Pipeline Capacity Increase	Increase size of development required pipe to accommodate additional future development	84,000												0	84,000	
	Well 54 Deaeration Tank	Construct deaeration tank at existing well 54	330,000												330,000	0	
	<b>Subtotal - Other Currently Planned Projects</b>		<b>330,000</b>	<b>204,000</b>	<b>0</b>	<b>1,359,000</b>	<b>0</b>	<b>0</b>	<b>700,000</b>	<b>523,000</b>	<b>0</b>	<b>523,000</b>	<b>0</b>	<b>0</b>	<b>1,030,000</b>	<b>2,609,000</b>	
			<b>534,000</b>		<b>1,359,000</b>			<b>1,223,000</b>						<b>0</b>	<b>3,639,000</b>		
	<b>Total Improvement Costs</b>																
		<b>Fiscal Year Total</b>	\$2,528,000	\$6,207,000	\$14,163,200	\$80,106,920	\$1,766,000	\$25,858,000	\$5,364,500	\$3,523,000	\$6,001,000	\$7,073,000	\$0	\$6,469,000		-	
		<b>Cumulative Total</b>	\$2,528,000	\$6,207,000	\$16,691,200	\$86,313,920	\$18,457,200	\$112,171,920	\$23,821,700	\$115,694,920	\$29,822,700	\$122,767,920	\$29,822,700	\$129,236,920		<b>\$29,822,700</b>	<b>\$129,236,920</b>
		<b>Fiscal Year Total</b>	\$8,735,000		\$94,270,120		\$27,624,000		\$8,887,500		\$13,074,000		\$6,469,000			-	
		<b>Cumulative Total</b>	<b>\$8,735,000</b>		<b>\$103,005,120</b>		<b>\$130,629,120</b>		<b>\$139,516,620</b>		<b>\$152,590,620</b>		<b>\$159,059,620</b>			<b>\$159,059,620</b>	



4/15/2019

constructed in the near-term period. This table also includes currently planned projects identified by District staff that support the existing water system, such as land acquisition and site development. The projects included in this 5-year capital improvement program are based on current District priorities and may not include all improvements identified for construction within the 5-year development horizon.

#### 8.3.4 Existing and Buildout EDUs

The calculation of total EDUs, under existing and future conditions, enables the District to effectively plan for capital improvement funding and to appropriately adjust water rates and impact fees as necessary. The calculation methodology for determining the existing, 5-year, and buildout EDU totals is briefly summarized as follows:

- **Existing:** Consistent with the 2012 WMP the existing number of EDUs were based on meter sizes of existing customers; the conversion factors utilized in determining the existing EDUs are summarized on [Table 8.8](#). It should be noted the existing EDUs were based on 2016 account information provided by District staff.
- **5-year Development:** The additional EDUs added through the 5-year development horizon were based on development information summarized in [Table 2.5](#).
- **Buildout Development:** The additional EDUs added through the Buildout development horizon were determined based on demand projections summarized in a previous chapter. The demand was converted to EDUs using a factor of 670 gpd/EDU, which is based on meter sizes and quantities, as provided by District staff, and using industry standard conversion factors.

The total number of EDUs at the existing, 5-year, and Buildout development horizons are summarized on [Table 8.9](#).



**Table 8.8 Water Meter EDUs**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Meter Size	Meter Type	Safe Maximum Operating Flow <sup>1,2</sup> (gpm)	EDU
5/8" & 3/4"	Positive Displacement Type	30	1.0
1"	Positive Displacement Type	50	1.7
1-1/2"	Positive Displacement Type	100	3.3
2"	Turbine Type	160	5.3
3"	Turbine Type	350	11.7
4"	Turbine Type	630	20.0
6"	Turbine Type	1,300	41.7
8"	Turbine Type	1,800	60.0



4/2/2018

Notes:

- 1: Source: WVWD 2012 Master Plan
- 2. Flows are based on safe maximum operating flow per AWWA standards C701-15

**Table 8.9 EDUs by Pressure Zone**  
 Water Facilities Master Plan  
 West Valley Water District

PRELIMINARY

Pressure Zone	Existing <sup>1</sup> (2016)	Total, 5-Year Projection <sup>2</sup> (2022)	Total, Buildout <sup>3</sup> (2055)
Zone 2	3,479	3,679	6,317
Zone 3	6,975	7,379	11,115
Zone 3A	2,120	2,170	2,227
Zone 4	3,209	3,269	3,675
Zone 5	3,232	4,232	4,522
Zone 6	5,051	6,858	10,506
Zone 7	4,199	6,611	10,293
Zone 8	91	481	1,081
<b>Total</b>	<b>28,356</b>	<b>34,679</b>	<b>49,736</b>



4/5/2019

Notes :

1. Existing EDUs based on 2016 account information provided by WVWD staff.
2. Includes additional EDUs based on 5-year growth information provided by WVWD staff.
3. Includes additional EDUs based on demand projections, assuming 670 gpd/EDU

**West Valley Water District**

---

**APPENDICES**

# **APPENDIX A**

## **Demand Unit Factor Comparison**

**Table 1 Average Daily Water Use Unit Factors**

Water Facilities Master Plan

West Valley Water District

PRELIMINARY

2012 Water Master Plan <sup>1</sup>					2019 Water Facilities Master Plan	
Land Use Designation	Development Density (du/ac)	Persons/du	Water Use <sup>2</sup>		Land Use Designation <sup>3</sup>	Water Use <sup>4</sup> (gpd/ac)
			(gpm/ac)	(gpd/ac)		
<b>Residential</b>						
Estate Residential	1	5.9	0.82	1,181		
Low Density	3	3.8	1.58	2,275		
Rural Residential	2	5.0	1.39	2,002	Residential 2	990
Medium Density	4	3.8	2.10	3,024		
Single Family	4	3.8	2.00	2,880		
Planned Community	4.5	3.2	1.75	2,520		
Medium High Density	9	2.1	2.62	3,773	Residential 6	2,650
Medium Density	9	2.1	2.62	3,773		
High Density	12	1.7	2.83	4,075	Residential 12	4,580
Very High Density		<i>Not included in 2012 WMP</i>			Residential 21	5,630
Regional Mixed Use	-	-	2.62	3,773		
<b>Non-Residential</b>						
Office	-	-	2.43	3,500	Office	1,410
Community Commercial	-	-	2.43	3,500	Commercial	1,800
Commercial Recreation	-	-	2.08	3,000	Retail	1,890
Industrial Park	-	-	1.39	2,000	Industrial	1,000
General Industrial	-	-	2.08	3,000	Heavy Industrial	1,530
Light Industrial	-	-	1.39	2,000	Light Industrial	500
Landfill	-	-	1.00	1,440		
School	-	-	2.43	3,500	Educational	1,790
Institutional		<i>Not included in 2012 WMP</i>			Institutional	1,410
Public Facility		<i>Not included in 2012 WMP</i>			Public Facility	230
Park	-	-	2.43	3,500	Landscape Irrigation	2,690
Golf Course	-	-	2.43	3,500		
Open Space	-	-	0.00	0		
Agricultural	-	-	0.00	0		
Public Utility Corridor (Greenbelt)	-	-	2.43	3,500		
Right of way	-	-	0.00	0		
Wells, Reservoirs, Energy	-	-	1.39	2,000	Utilities	10

**AKEL**  
ENGINEERING GROUP, INC.

3/2/2018

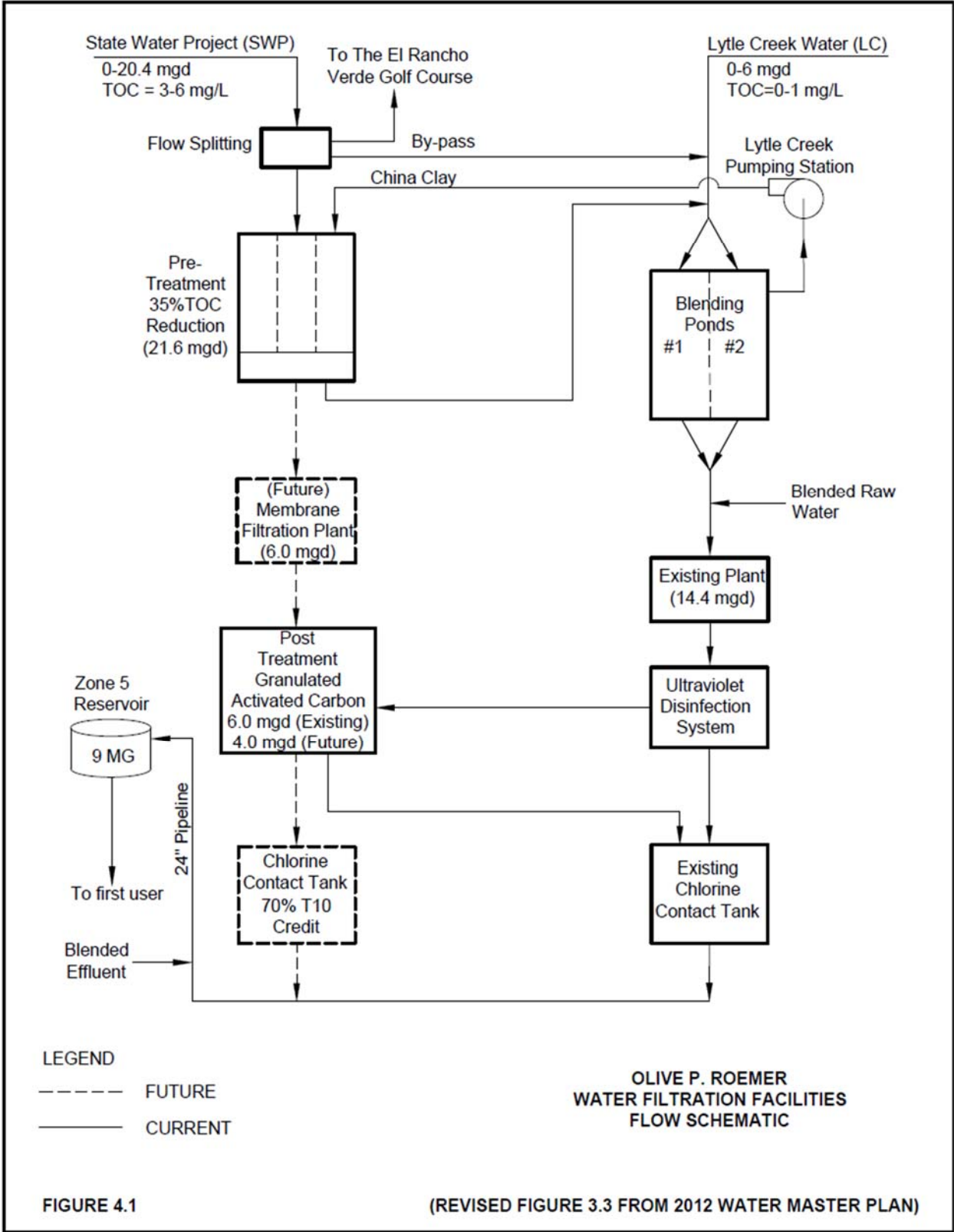
## Notes:

1. Land use designations and water use extracted from WVWD 2012 Water Master Plan, Table 5.1.
2. Residential water use factors calculated assuming 200 gallons per person per day.
3. Land use designations extracted from parcel database provided by WVWD staff July 5, 2017.
4. Water use factors calculated based on existing development and 2016 consumption records normalized to 2014 production minus 10%.



# **APPENDIX B**

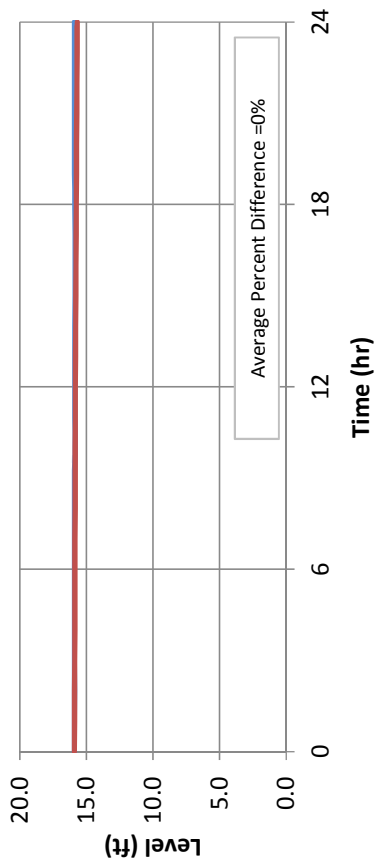
## **OPR Facility Flow Schematic**



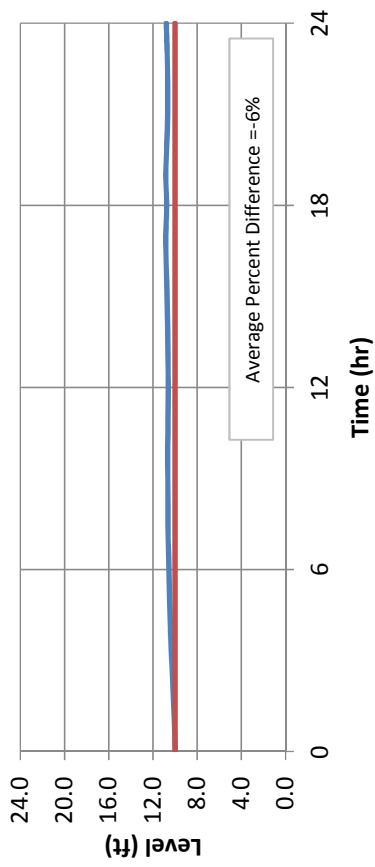
# APPENDIX C

## Hydraulic Model Calibration

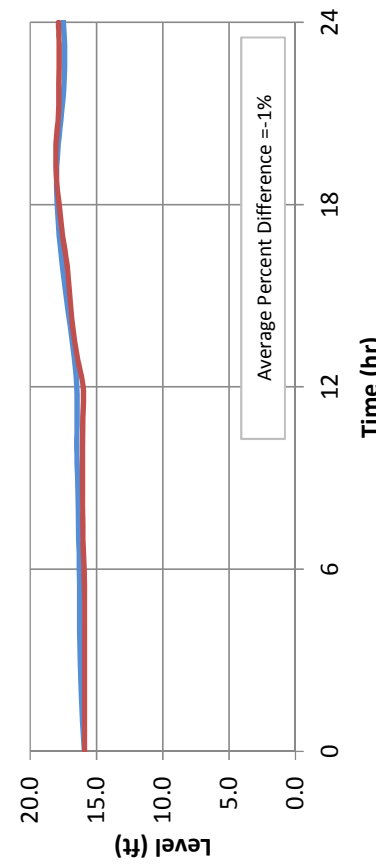
**Tank 2-1**



**Tank 2-2,3**



**Tank 2-4**



**LEGEND**

- SCADA (July 9, 2017)
- Hydraulic Model

PRELIMINARY

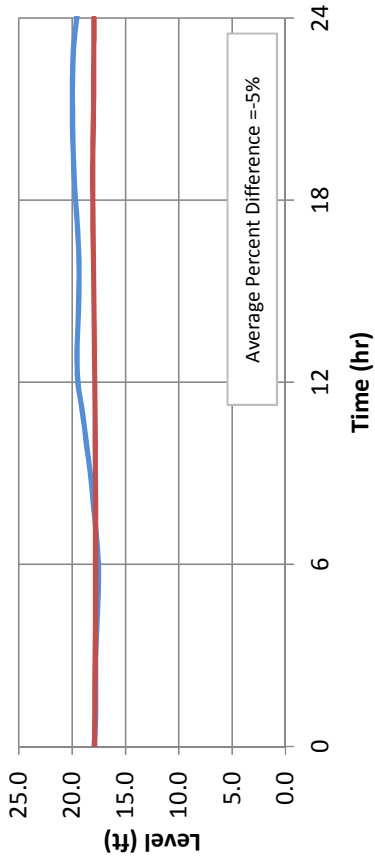
January 23, 2018

**Figure 1  
Tank  
Calibration**

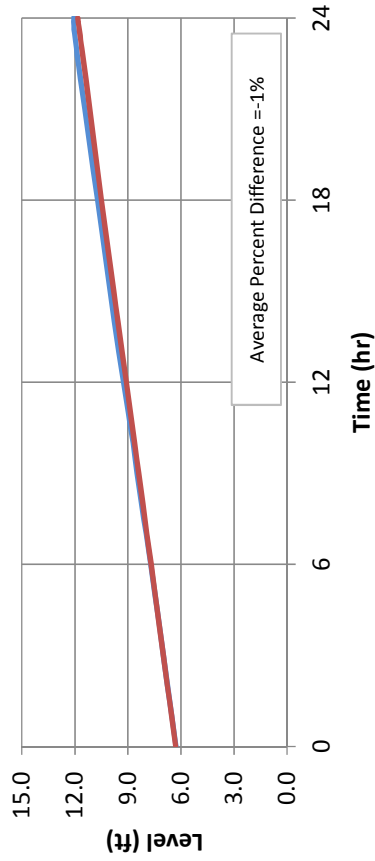
Water Facilities Master Plan  
West Valley Water District



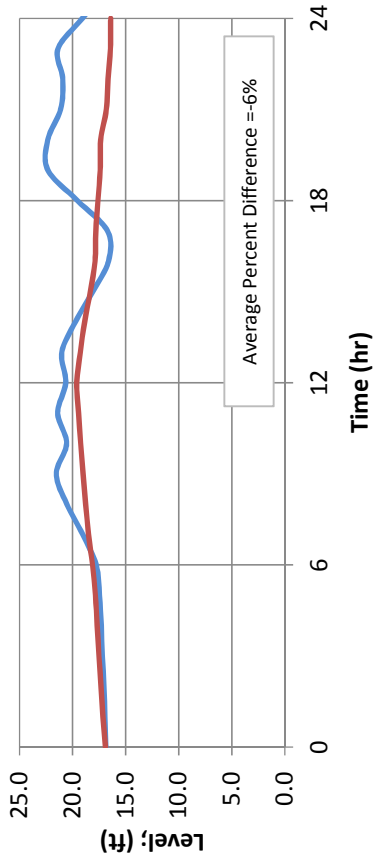
**Tank 3-2**



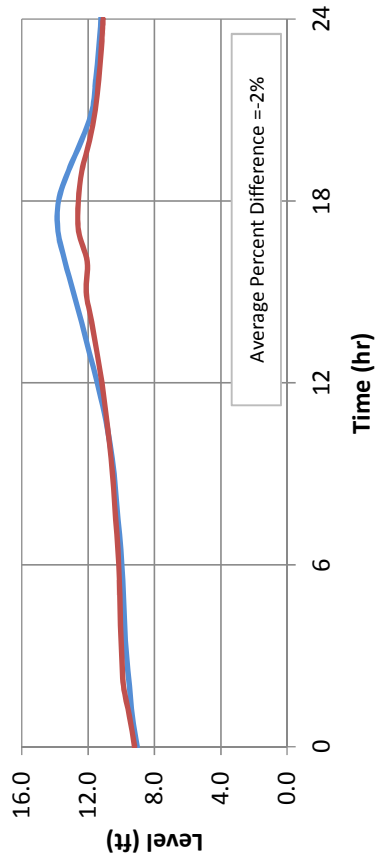
**Tank 4-3**



**Tank 3-1,3**



**Tank 4-1,2**



PRELIMINARY

January 23, 2018

**Figure 2  
Tank  
Calibration**

Water Facilities Master Plan  
West Valley Water District

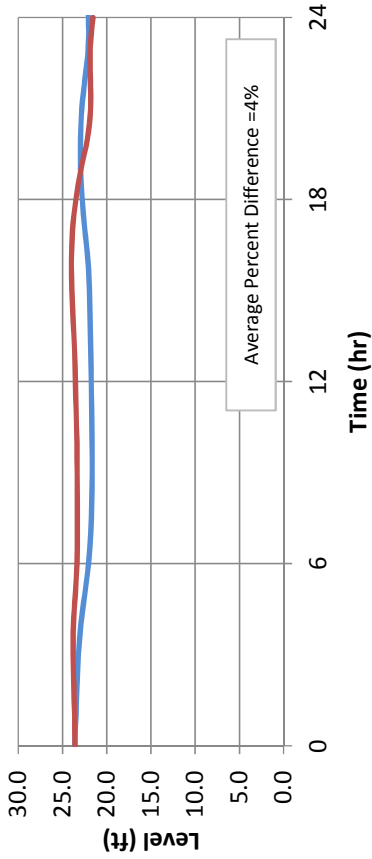


**LEGEND**

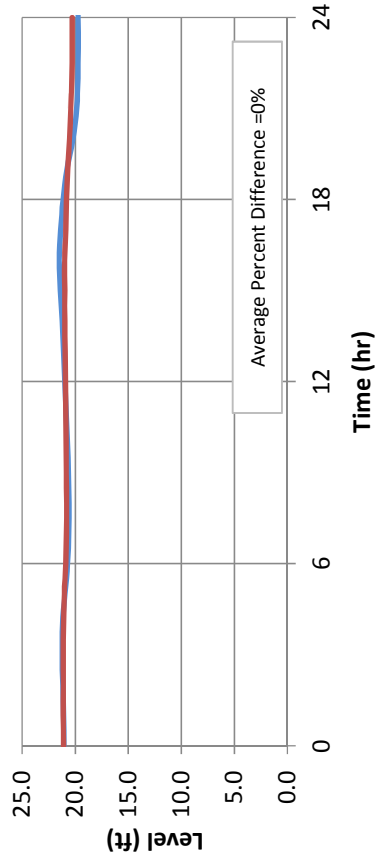
- SCADA (July 9, 2017)
- Hydraulic Model



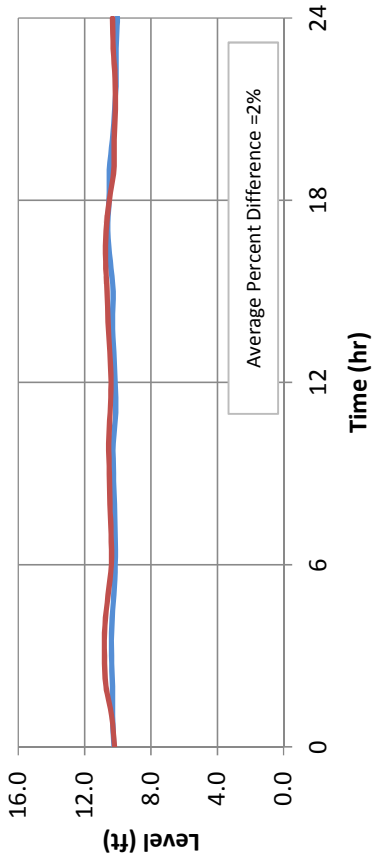
**Tank 6-1,2,3,4**



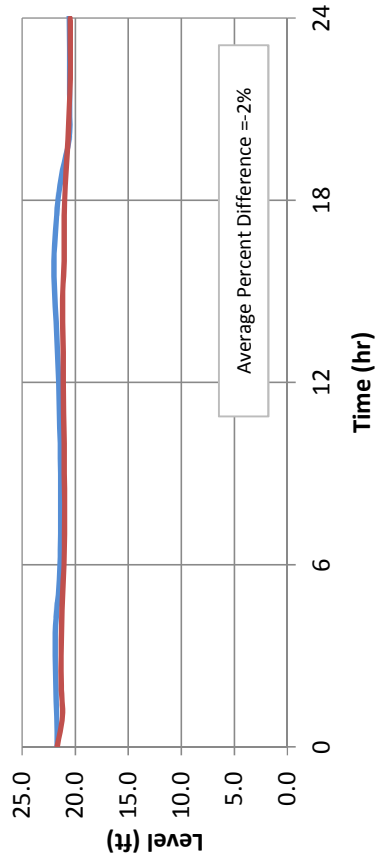
**Tank 7-2,3,4**



**Tank 5-1,2,3**



**Tank 7-1**



**Figure 3  
Tank  
Calibration**

Water Facilities Master Plan  
West Valley Water District



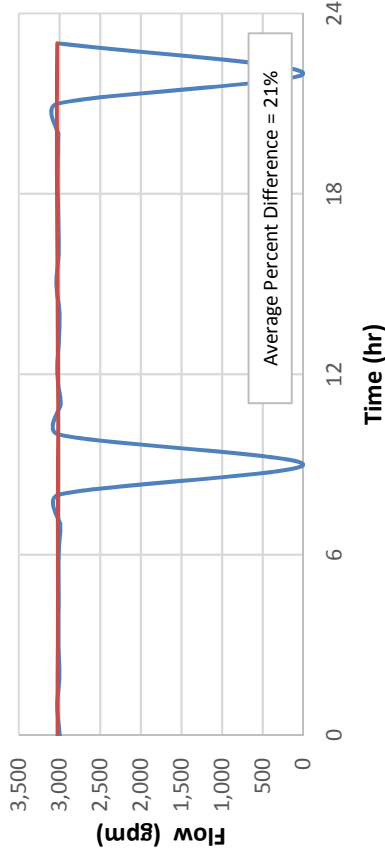
PRELIMINARY

January 23, 2018

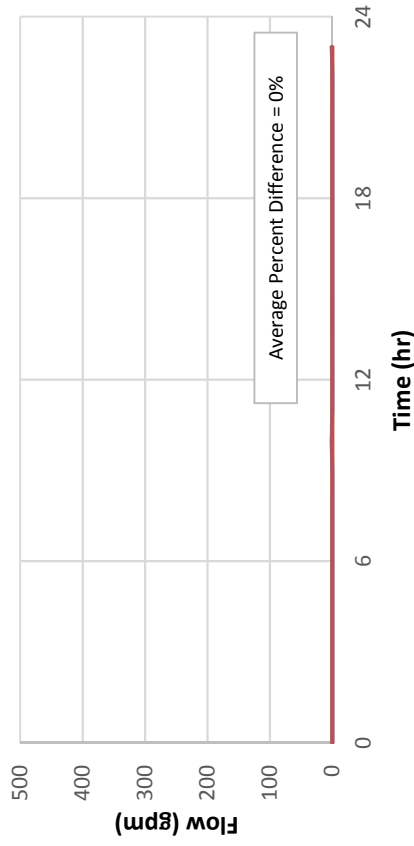
**LEGEND**

- SCADA (July 9, 2017)
- Hydraulic Model

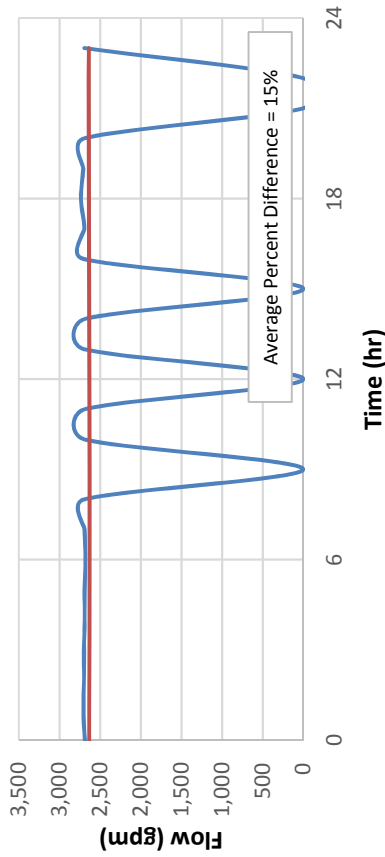
9th Street - South Well



Well 30



9th Street - North Well



Well 15

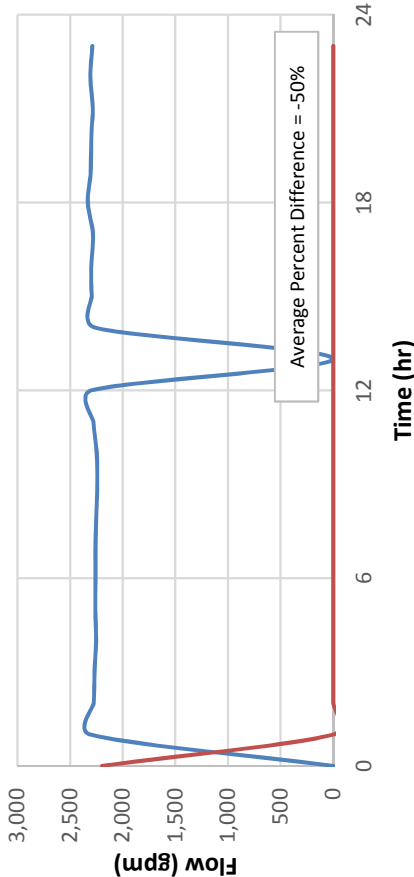


Figure 4

Well Calibration

Water Facilities Master Plan  
West Valley Water District



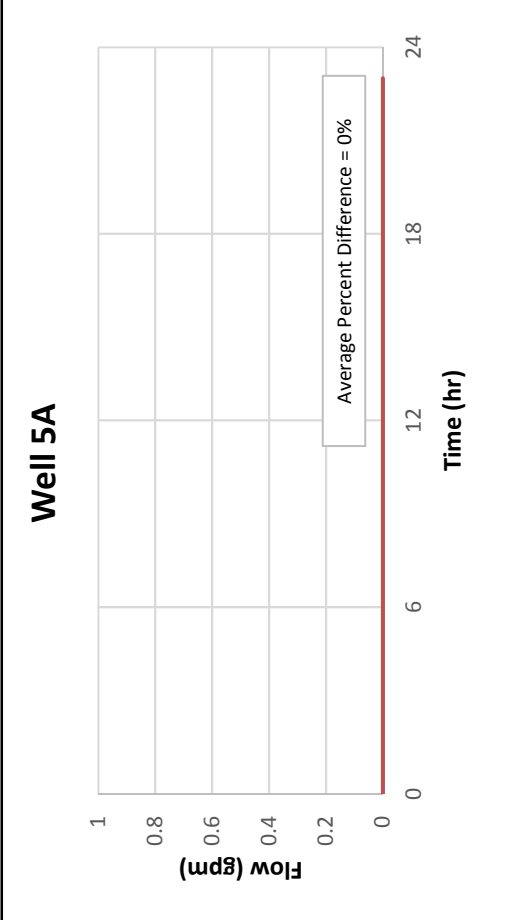
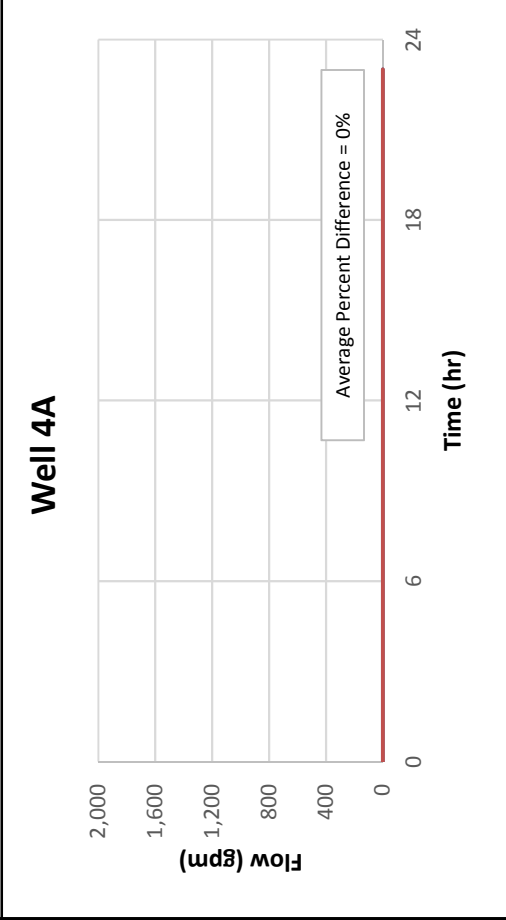
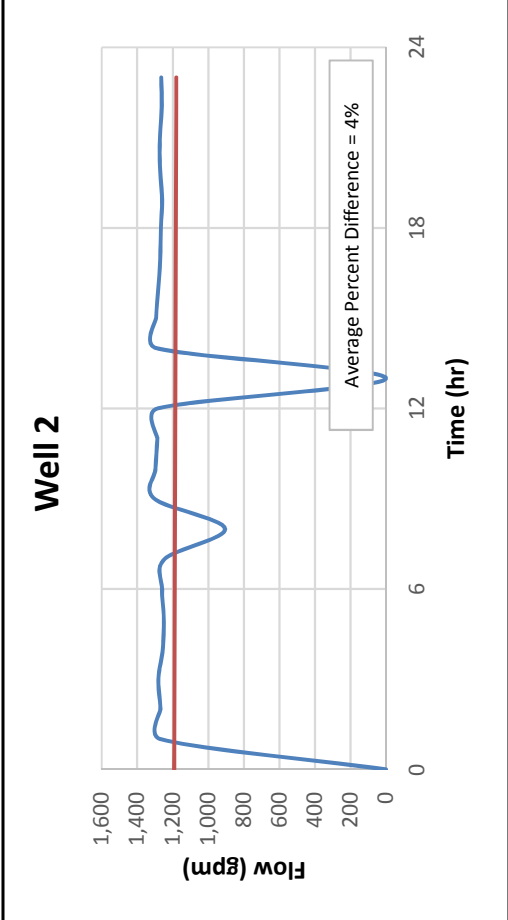
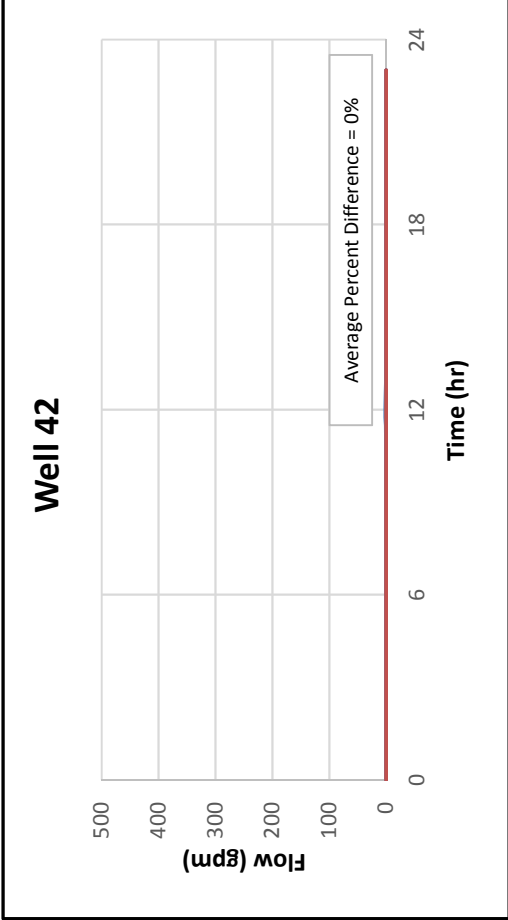
PRELIMINARY

Note: Graphs showing zero flow indicate pump did not operate during calibration period

January 23, 2018

LEGEND

- SCADA (July 9, 2017)
- Hydraulic Model



**LEGEND**

- SCADA (July 9, 2017)
- Hydraulic Model

**PRELIMINARY**

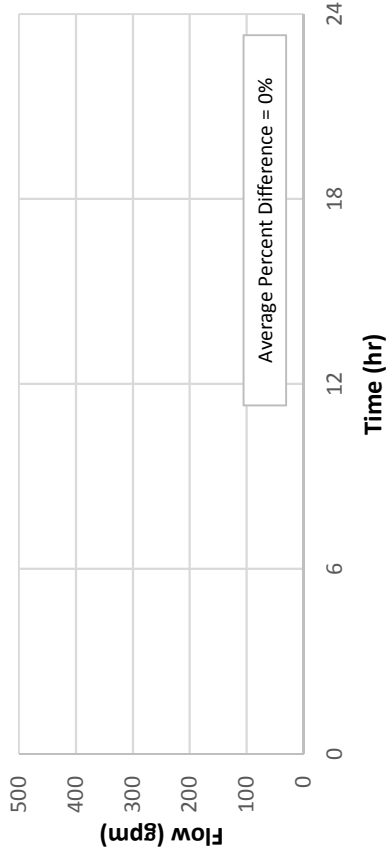
Note: Graphs showing zero flow indicate pump did not operate during calibration period

January 23, 2018

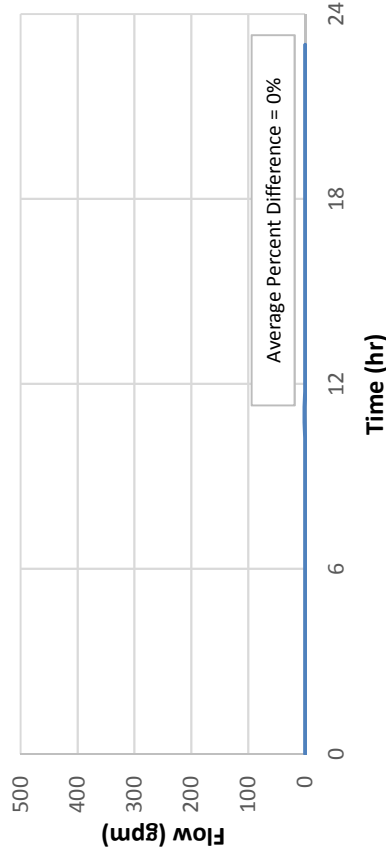
## Figure 5 Well Calibration

Water Facilities Master Plan  
West Valley Water District

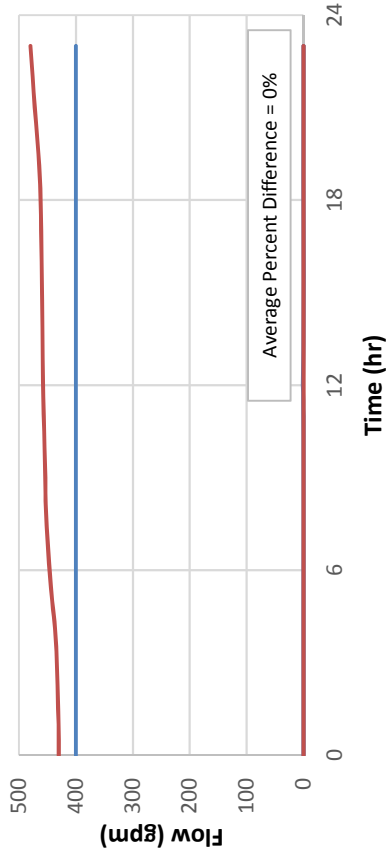
**Well 54**



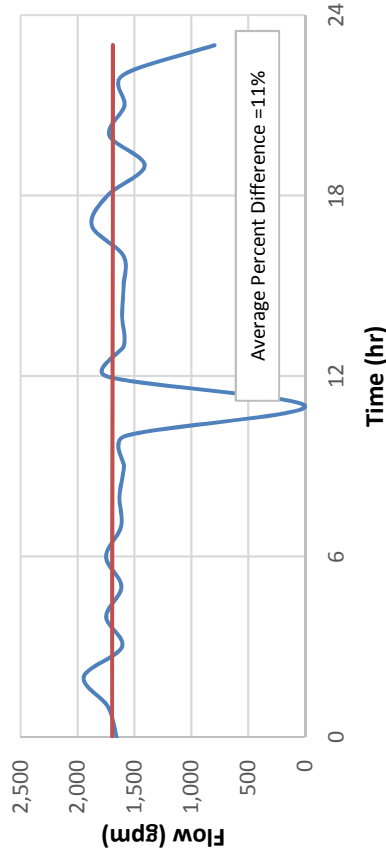
**Well 11**



**Well 24**



**Well 6**



**Figure 6**

**Well**

**Calibration**

Water Facilities Master Plan  
West Valley Water District



**PRELIMINARY**

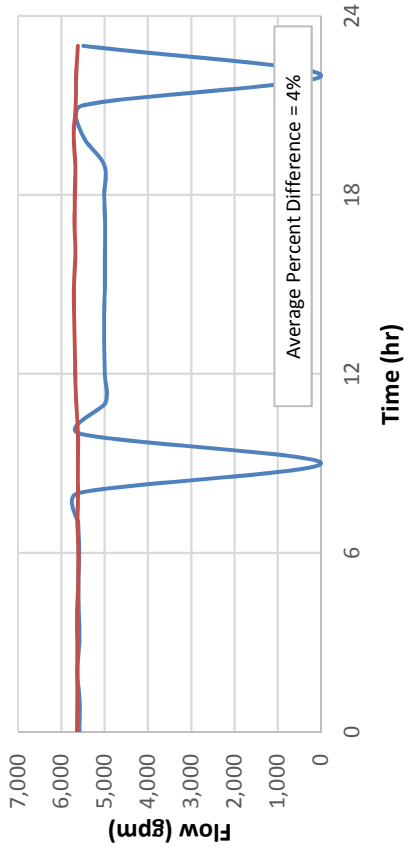
Note: Graphs showing zero flow indicate pump did not operate during calibration period

January 23, 2018

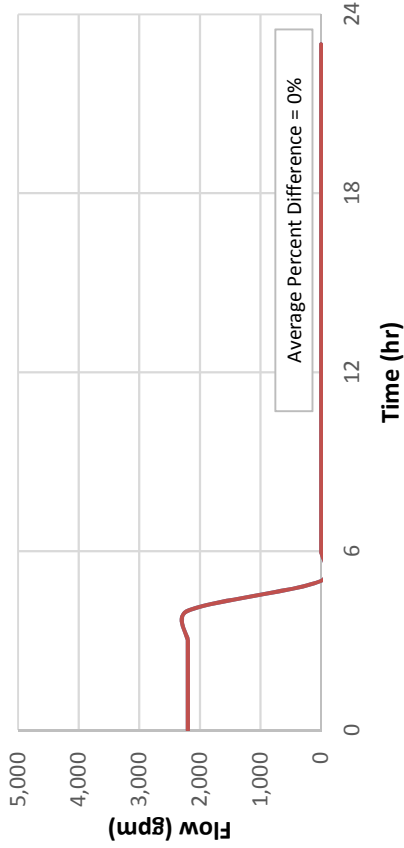
**LEGEND**

- SCADA (July 9, 2017)
- Hydraulic Model

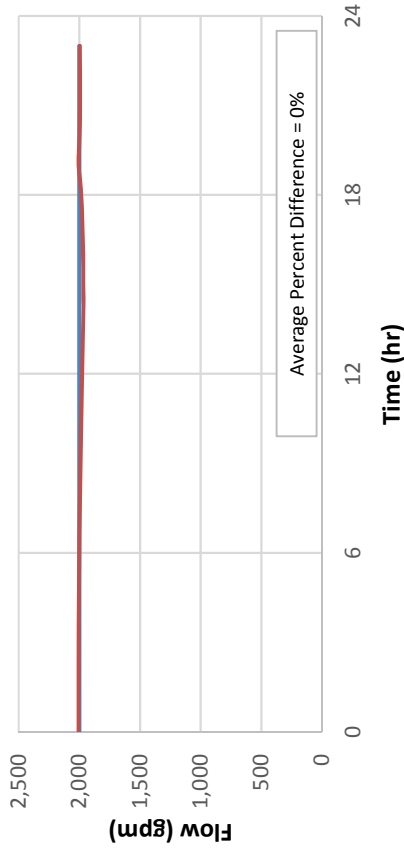
9th Street Pump Station



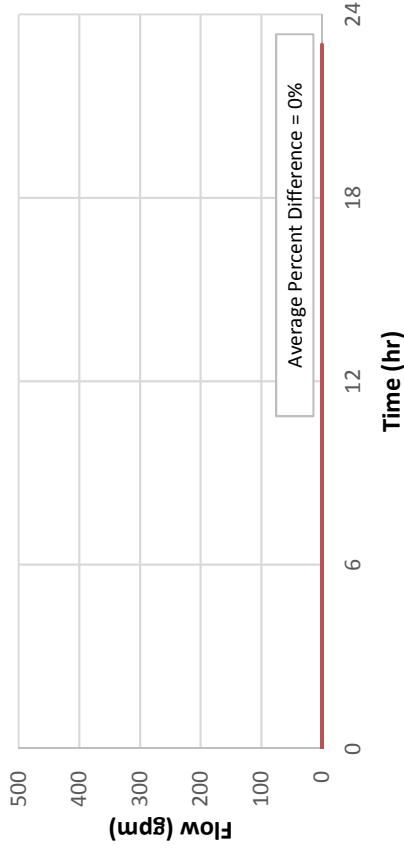
3A Pump Station



4-1 Pump Station



4-2 Pump Station



**LEGEND**

- SCADA (July 9, 2017)
- Hydraulic Model

**PRELIMINARY**

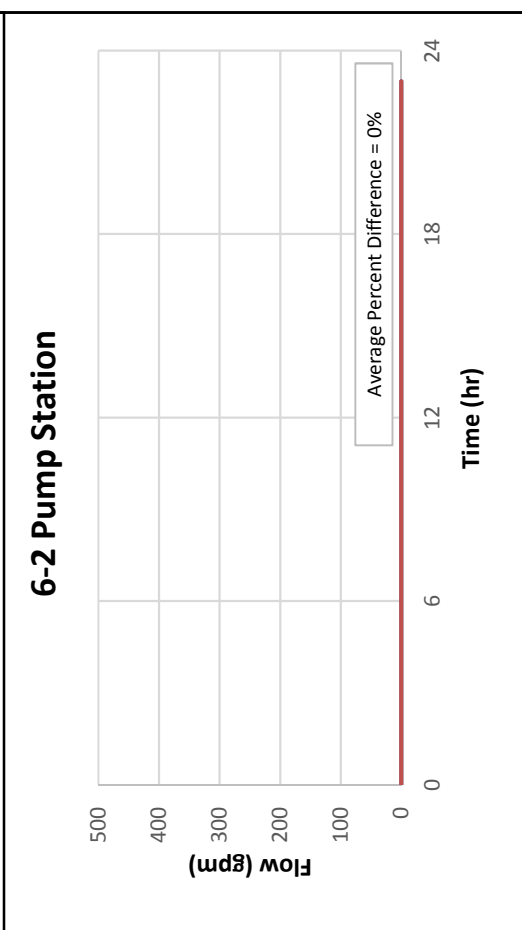
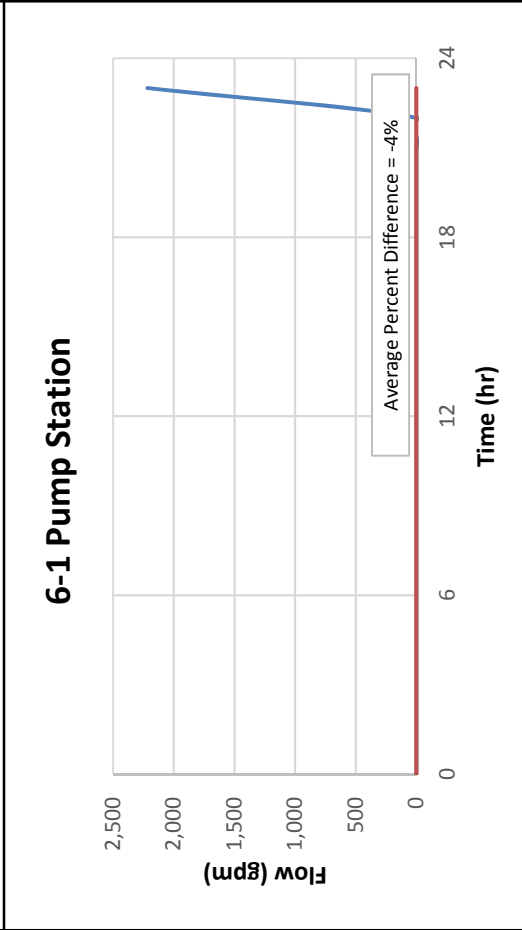
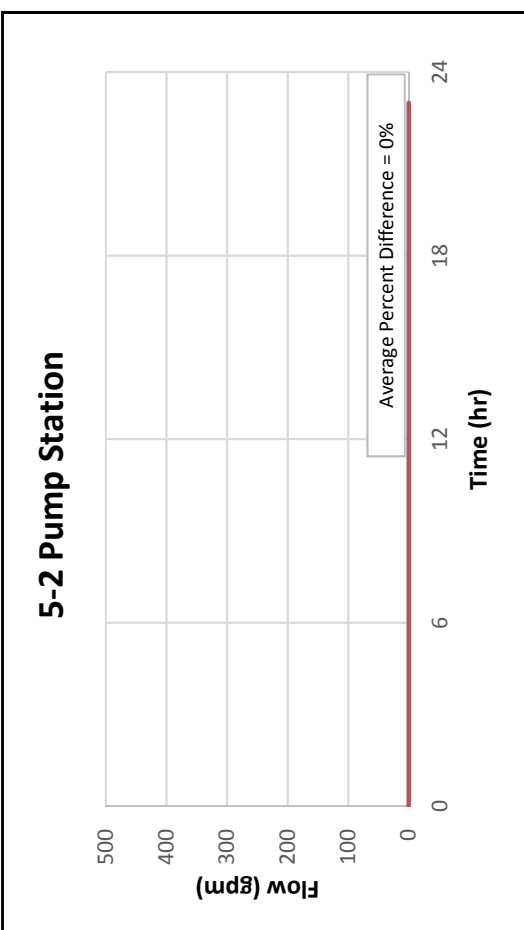
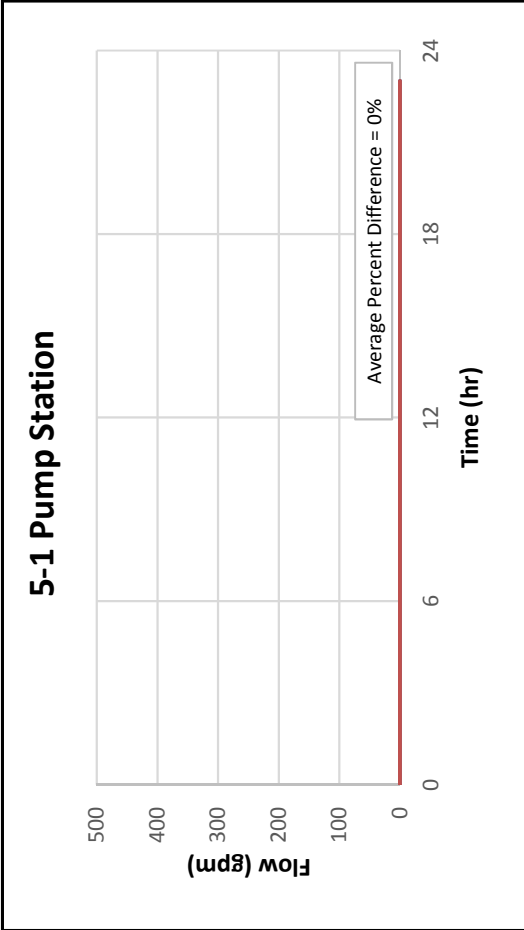
Note: Graphs showing zero flow indicate pump did not operate during calibration period

January 23, 2018

**Figure 7  
Booster  
Calibration**

Water Facilities Master Plan  
West Valley Water District





**Figure 8  
Booster  
Calibration**  
Water Facilities Master Plan  
West Valley Water District

**PRELIMINARY**

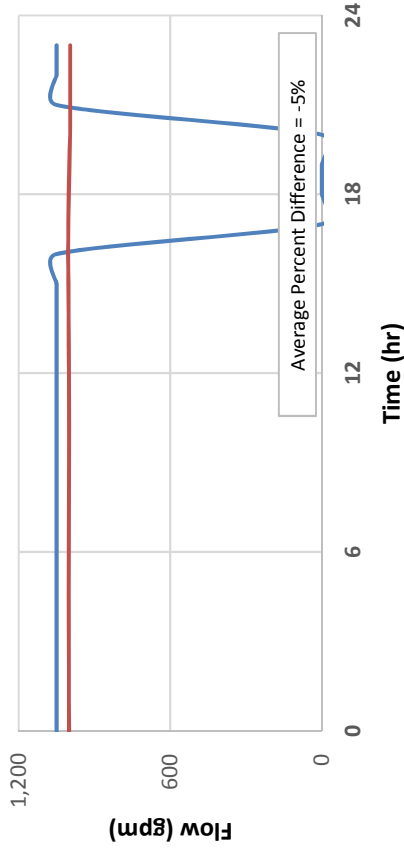
**LEGEND**  
— SCADA (July 9, 2017)  
— Hydraulic Model

Note: Graphs showing zero flow indicate pump did not operate during calibration period

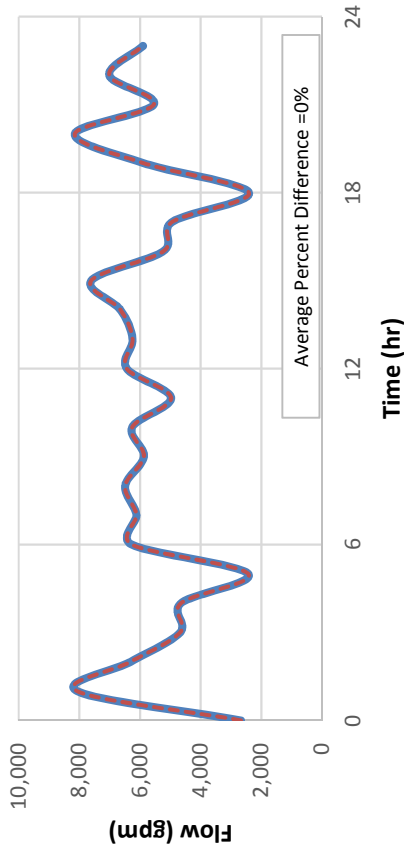
January 23, 2018



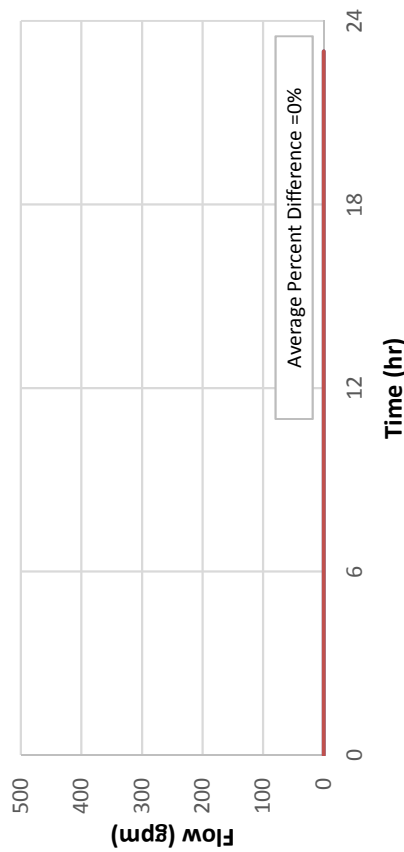
### 7-1 Pump Station



### OPR WFF Pump Station



### 8-2 Pump Station



## Figure 9 Booster Calibration

Water Facilities Master Plan  
West Valley Water District  
**West Valley Water District**

PRELIMINARY

Note: Graphs showing zero flow indicate pump did not operate during calibration period

January 23, 2018

#### LEGEND

- SCADA (July 9, 2017)
- Hydraulic Model



**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** REVIEW 2012 CAPACITY CHARGE STUDY BASED ON THE 2012 WATER MASTER PLAN

---

**DISCUSSION:**

New development places additional demands upon existing facilities and often requires the construction of new or expanded facilities to maintain service standards. To ensure that the District collects sufficient funds to construct the master planned facilities, the District should periodically review and update its Capacity Charges to adjust for the increased cost of construction and/or any material changes to the list of master planned facilities.

Government Code Section 66013(b)(3) defines a “Capacity Charge” to mean a “charge for public facilities in existence at the time a charge is imposed or charges for new public facilities to be acquired or constructed in the future that are of proportional benefit to the person or property being charged.

A Capacity Charge is not a tax, special assessment or rate increase on existing development, but is a one-time charge to new applicants for service. Capacity Charges imposed represent a proportionate share of the cost of facilities necessary to provide system capacity to a new development.

The last Capacity Charge Study prepared for the District was in 2012. Attached in **Exhibit A** is a copy of the 2012 Capacity Charge Study.

**FISCAL IMPACT:**

The preparation of a Capacity Charge Study is a budgeted item in the 2019/20 Engineering Department Budget (Professional Services/Other Consultants).

**STAFF RECOMMENDATION:**

It is recommended that the Engineering, Operations and Planning Committee approve staff preparing and issuing a Request for Proposals for a Capacity Charge Study.

Respectfully Submitted,



---

Clarence Mansell Jr, General Manager

LJ:ce

**ATTACHMENT(S):**

1. Exhibit A - 2012 Capacity Charge Study

# EXHIBIT A

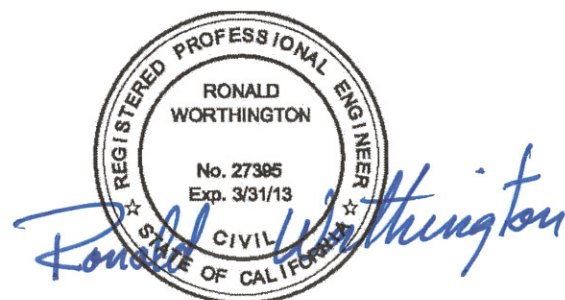
**WEST VALLEY WATER DISTRICT**  
**2012 CAPACITY CHARGE STUDY**  
**(Based on the 2012 Water Master Plan)**

**August 3, 2012**

Prepared By:

*Engineering Resources of Southern California, Inc.*  
1820 Commercenter Circle  
San Bernardino CA 92408

Job No. 62026.186



# WEST VALLEY WATER DISTRICT

## 2012 CAPACITY CHARGE STUDY

### I. INTRODUCTION

#### A. PURPOSE

The purpose of this 2012 Capacity Charge Study is to establish the proportional benefit to the new development that occurs in the District and the need for replacement of existing water facilities and the construction of new water facilities based on the 2012 Water Master Plan. The 2012 Capacity Charge Study prepared by Engineering Resources of Southern California, Inc. (ERSC) is to calculate the capacity charge fee to be levied for each Equivalent Dwelling Unit (EDU) in the District, based on the proportionate share of the total facilities for each EDU. The charge is developed by taking the total costs of the existing and future water facilities divided by the ultimate number of EDU's (70,068 EDUs).

#### B. AUTHORITY

The capacity charge study will comply with applicable Government Code (Chapter 7 of the Mitigation Fee Act, Connection Fees and Capacity Charges, Government Code Section 66013, *et seq.* (SB 1760 and SB 699)).

##### 1. *Purpose of the Capacity Charge*

The purpose of the capacity charge is to provide a mechanism for persons or property hooking-up to the District water system to pay their proportional share of District facilities in existence or to be constructed, including, but not limited to, the following:

- Supply Facilities (Wells and Water Treatment Plants)
- Transmission System (Transmission Lines and Pumping Stations)
- Storage (Water Reservoirs)
- District Operation Facilities, and
- Financing and Interest on Bonds

##### 2. *Use of Fees*

The capacity charges will fund the replacement of all existing and construction of future water facilities. That portion of the Capacity Charge allocated for replacement of existing facilities will be added to the District's replacement fund for use as and when existing facilities reach the end of their useful life and require replacement.

##### 3. *Relationship between Use of Fees and Type of Development*

New development in the District will have both a direct and cumulative impact through increased water facilities within the District. Completion of the necessary major water improvements will ensure that the increased demand of water within the District caused



by new development will not result in decreased service levels or worsen public safety hazards.

#### **4. *Relationship between Need for Facility and Type of Project***

Each new residential and nonresidential development project in the District will add to the incremental need for water demand, and each new project will benefit from the new water capacity. For new development to occur during the planning horizon of the District's 2012 Water Master Plan, major water improvements identified by the District will be necessary to maintain at least the current level of service by maintaining acceptable water flows. The need for water improvements such as Wells, Treatment, Storage, Pumping Stations, and Transmission Lines will be determined, constructed, and be placed on-line when necessary to best serve the District's Water System operation requirements.

#### **5. *Relationship between the Amount of Fees and Cost of or Portion of Facility Attributed to Development on Which Fee is Imposed***

The District's 2012 Water Master Plan identified water system improvements necessary to serve new development. The ultimate growth and estimated costs of improvements are the basis of this capacity study.

The improvement costs to be funded by new development in the District are allocated to each benefiting EDU using a cost allocation method that measures the relative benefit for each EDU. The costs were allocated using estimated costs and present worth values of facilities for April 2012. The result is a fee for each EDU of new development that reflects the relative water impact on the major water system.

## **II. SUPPLY FACILITIES**

Water supply will be either from Lytle Creek water or State Project Water, with water treatment facility or local well water with wellhead treatment facility. The cost of supply facilities per EDU, State Water Project water and water treatment facilities is the total estimated cost of water treatment facilities divided by total EDU at build-out.

The cost of supply facilities per EDU for local well water is the estimated drilling and equipment cost plus wellhead treatment per well using a typical well production of 1,500 gpm and 700 gpd/EDU with a peaking factor of 1.7 requirement as shown on Table 4.1, Domestic Water Demand, in the 2012 Water Master Plan.

In November 2009, a Comprehensive Water Plan was passed by state legislature to meet California's growing water demands. The plan consists of four policy bills aimed to provide a more reliable water supply while preserving the Delta ecosystem. Senate Bill No. 7 addresses statewide water conservation including a 20 percent reduction in urban water use by 2020.

Future demands per person are expected to decrease based upon water conservation programs employed by the District, by regional incentive programs, water conserving fixtures/appliances, the Green Building Codes, new ordinances/laws, and general education of the public.

A. Lytle Creek Water and State Project Water with Water Treatment Facilities		
1.	Oliver P. Roemer Plant The improvements to the Oliver P. Roemer Plant are identified in Section 3.7 Oliver P. Roemer Water Filtration Facility and Section 7.3.5 Oliver P. Roemer Water Filtration Facility, in the 2012 Water Master Plan.	\$41,500,000
2.	New 4.0 Million Gallon per Day (MGD) Water Filtration Plant See Section 7.3.6 4.0 MGD Water Filtration Facility (Future), in the 2012 Water Master Plan.	\$12,000,000
3.	Groundwater Wellhead Treatment System Project See Section 7.3.9 South System - Zone Nos. 3 and 3A, for a description of Groundwater Wellhead Treatment System Project, in the 2012 Water Master Plan.	
	Phase I	\$ 3,000,000
	Phase II	<u>\$12,000,000</u>
	Total	\$68,500,000
	Lytle Creek Water and State Project Water with Water Treatment Facilities per EDU \$68,500,000 divided by 70,068 EDU's	= \$ 978/EDU

B. Well Water		
See Existing and Future Well Pumping Facilities on pages viii and ix of the Table of Contents, Table 3.3 Existing Well Capacity, and Table 7.11 Recommended Future Wells, in the 2012 Water Master Plan		
1.	Well (1,500 gpm) Drilling and Equipping for New Wells \$1,500,000/well <u>\$ 200,000</u> (Engineering & Inspection, etc.)	
	<u>\$1,700,000</u> x 0.83 gpm/EDU \$1,500 gpm	= \$ 941/EDU
2.	Well Head Treatment Required for New Wells (1,500 gpm) \$1,500,000/well <u>\$ 100,000</u> (Engineering & Inspection, etc.)	
	<u>\$1,600,000</u> x 0.83 gpm/EDU \$1,500 gpm	= \$ 885/EDU
3.	Well Head Treatment - Arsenic Removal for Well No. 2 - \$2,626,000 \$2,626,000 divided by 70,068 EDU's	= \$ 37/EDU
	Well Water Total per EDU	= \$1,863/EDU
	Total for Supply Facilities	= \$2,841/EDU



### III. TRANSMISSION SYSTEM

The transmission system is based on supply peak day demand for an estimated 70,068 total EDUs at ultimate build out.

A.	Baseline Feeder (Reach III and IV)		
	48-inch pipeline x 11,520 LF @ \$288/LF <sup>(1)</sup>	=	\$3,318,000
	+ 15% Eng + Insp + Admin.	=	\$ 498,000
	Subtotal	=	\$3,816,000
	WVWD has 1/3 interest in Baseline Feeder	=	\$1,272,000

B. Transmission Lines  
 See Section 3.5 Pipelines for Existing Pipelines in the 2012 Water Master Plan, and Attachment No. 1 for Existing and Future Transmission Lines.

All pipelines 12-inch diameter or larger in WVWD’s system are considered transmission pipelines. 12-inch pipelines within residential areas are considered both transmission and distribution pipelines. Therefore, only 1/3 of the cost of 12-inch pipelines within residential will be considered as transmission costs for capacity charges. There is approximately 10,700 acres of land use residential designation versus approximately 11,370 acres of commercial industrial and public land use designation within WVWD’s service area. Therefore, 52 percent of the 12-inch pipelines (52% x 535,600 LF = 278,500 LF) will be assigned full value and 48% of the 12-inch pipelines (48% x 535,600 LF = 257,100 LF) will be assigned full 1/3 the value for the capacity charge.

<u>Size</u>	<u>Length (LF)</u>	<u>Unit Price <sup>(1)</sup></u>	<u>Construction Cost</u>
36-inch	2,000	\$216/LF	\$ 432,000
30-inch	50,500	\$180/LF	9,090,000
24-inch	191,700	\$144/LF	27,605,000
20-inch	72,000	\$120/LF	8,640,000
18-inch	74,600	\$108/LF	8,057,000
16-inch	153,700	\$96/LF	14,755,000
14-inch	2,200	\$84/LF	185,000
12-inch	278,500	\$72/LF	20,052,000
12-inch	257,100	\$72/LF x 1/3	<u>6,164,000</u>
		Subtotal	\$94,980,000
		+ 15% Eng + Insp + Admin	<u>\$14,247,000</u>
		Transmission Lines Total Cost	\$109,227,000

<sup>(1)</sup> Pipeline costs are based on \$6.00 per inch diameter

C. Pumping Stations  
See Existing and Future Pumping Facilities on page x of the Table of Contents and Table 3.4 Existing Pumping Facilities in the 2012 Water Master Plan

7 @ \$1,050,000 each for Water Filtration Facility-1 (WFF-1), WFF-2, 3A-1, 4-2, 5-1, 6-1, 7-1	\$ 7,350,000
9 @ \$2,000,000 (Newer PS) each for 4-3, 5-2, 5-3, 6-2, 6-3, 7-2, 7-3, 8-2 and 8-3	\$ 18,000,000
1 @ \$800,000 each for 4-1	\$ 800,000
3 @ \$400,000 each for PZ-3 transfer, PZ-4 interzone booster, 8-1	<u>\$ 1,200,000</u>
Subtotal	\$ 27,350,000
+ 15% Eng. + Insp + Admin	<u>\$ 4,102,000</u>
Pumping Stations Total Cost	\$ 31,452,000

Transmission System	
Baseline Feeder	\$ 1,272,000
Transmission System	\$109,227,000
Pumping System	<u>\$ 31,452,000</u>

Total \$141,951,000

Total for Transmission System per EDU  
\$141,951,000 divided by 70,068 EDUs = \$2,026/EDU

**IV. STORAGE (WATER RESERVOIRS)**

See Existing and Future Storage Facilities on page vii of the Table of Contents, Table 3.2 Existing Storage Facilities, and Table 7.9 Summary of Storage Requirements in the 2012 Water Master Plan.

Storage is based on providing one day peak demand, plus fire flow and pumping storage in Zones 4, 5, 6, and 7. The 2012 Water Master Plan Table 7.9, "Summary of Storage Requirements," shows an ultimate total required storage of 134.70 million gallons for 70,068 EDUs.

134.70 million gallons divided by 70,068 EDUs = 1,922 gallons per EDU

Average cost of 4.0 million gallon reservoir is estimated to be \$3,000,000 (Present Worth (PW) for April 2012), which includes construction costs, engineering, inspection, land, site work, administration, legal, etc. \$3,000,000 divided by 4.0 million gallons = \$ 0.75/gallon.

Total for Storage 1,922 gal/EDU x \$ 0.75 /gallon = \$1,442/EDU

**V. DISTRICT OPERATIONS FACILITIES**

The following existing facilities are necessary to operate the water system and the District does not have plans for any more facilities for this purpose.

Building A*	\$1,123,600
Building B*	1,114,300
Building C*	178,400
Building D*	187,600
South Operations Building*	109,500
District Headquarters Expansion*	<u>4,285,500</u>

	Subtotal	\$6,998,900
--	----------	-------------

\*Present Worth for April 2012

Facilities Total		
\$6,998,900 divided by 70,068 EDUs	=	\$ 100/EDU

**VI. FINANCING AND INTEREST ON BONDS**

A. Water Participation Rights (SBVMWD) (WVWD’s 06/30/11 Audit Statement and Agreement with SBVMWD adopted on 04/05/12 by WVWD’s Board).

See Attachment No. 2.

B. CSCDA Series 2006D-2 Revenue Bonds

See Attachment No. 3.

<u>Bond Description</u>	<u>Amount</u>
Water Participation Rights (SBVMWD*)	\$ 9,646,000
Series 2006D-2 Revenue Bonds	<u>32,365,000</u>

	Subtotal	\$42,011,000
--	----------	--------------

Financing Total		
\$42,011,000 divided by 70,068 EDUs	=	\$ 600/EDU

**VII. TOTALS**

Supply Facilities	\$2,841/EDU
Transmission System	2,026/EDU
Storage	1,442/EDU
Operations Facilities	100/EDU
Financing and Interest on Bonds	<u>600/EDU</u>

<b>TOTAL CAPACITY CHARGE</b>	<b>\$7,009 Per EDU</b>
------------------------------	------------------------

The capacity charge was \$4,857/EDU based on the June 2004 Study. The Engineering News Record's Construction Cost Index (ENR CCI) was 7,064 in June of 2004 for 20 cities. The current (April of 2012) ENR CCI is 9,273, which is a 31.3 percent increase from June 2004. If we look at the June 2004 Capacity Charge of \$4,857/EDU and increase it by 31.3% ( $\$4,857/\text{EDU} \times 1.31\% = \$6,377/\text{EDU}$ ), the value could be \$6,377/EDU, based on ENR Construction Cost Adjustment.

However, the 2012 Capacity Charge Study includes costs for drilling and equipping wells and wellhead treatment which are now greater than 2.5 times the estimated cost in the 2004 Capacity Charge Study. Also, the water treatment facilities did not include a groundwater treatment system for perchlorate removal and a new 4.0 MGD water filtration plant yielding a cost of \$7,009/EDU.

Therefore, **ERSC** recommends that the method shown in this study using the 2012 Water Master Plan Data, be used to calculate the capacity charge. The District's current capacity charge is \$5,230/EDU which was adjusted based on ENR Construction Index from June 2004 to November 1, 2007. **ERSC** recommends that the Capacity Charge be increased from the present \$5,230 to \$7,009/EDU.



# ATTACHMENTS

**ATTACHMENT NO. 1**  
**TRANSMISSION LINES**  
**(12" and Above)**

<b>EXISTING</b>		<b>FUTURE</b>	
<b>SIZE</b>	<b>LENGTH (LF)</b>	<b>SIZE</b>	<b>LENGTH (LF)</b>
48"	11,520	30"	5,300
36"	2,000	24"	61,200
30"	45,200	20"	5,800
24"	130,500	18"	16,900
20"	66,200	16"	38,500
18"	57,700	12"	139,500
16"	115,200		
14"	2,200		
12"	396,100		

## ATTACHMENT NO. 2

## WATER PARTICIPATION RIGHTS

**History**

In or about late 1989 and early 1990, the San Bernardino Valley Municipal Water District (“Valley District”) entered into separate agreements with the District, City of Rialto (“City”) and Riverside Highland Water Company (“RHWC”) for the construction of certain water supply facilities (“Baseline Feeder”).

In or about 1990 Valley District constructed the Baseline Feeder which consisted of two (2) wells (i.e., the Ninth Street Well and the Perris Street Well), a pipeline and other associated facilities to convey water to the District, City and RHWC.

In or about 2005, the Ninth Street Well became inoperable due to a deteriorated well case. In the same year, the Perris Street Well became inoperable due to a clogged screen.

On or after 2005, Valley District, District, City and RHWC (collectively, “Parties”) initiated discussions regarding the construction of two (2) new replacement wells. The conceptual agreement was the construction of two (2) wells, a reservoir, pump station and other appurtenances thereto, including, but not limited to, a chlorination system (“Project”).

Valley District tentatively agreed to fund the construction of the project through tax free bonds. The District agreed that the two wells could be constructed on property owned by the District.

In or about 2010, Valley District circulated to District, City and RHWC a document entitled “Principles Documents Baseline Feeder Contracts Extension” (“Principles”). The purpose of the document was to set forth the terms on which the Project would be (1) constructed, (2) paid for, and (3) owned and operated. The Parties took significant time discussing and negotiating a final draft of the Principles.

In or about 2011, the Principles were converted to a first draft of the Restated Agreement. From the time of the circulation of the first draft of the Restated Agreement to this time, the Parties have negotiated the final terms and conditions of the Restated Agreement which has been presented to the Board.

**Restated Agreement:**

The Restated Agreement provides, amongst other things, for the (1) construction, operation and maintenance of the Project; (2) operation and maintenance of that portion of the Baseline Feeder which existed prior to the Project; (3) the payment for the planning, design, financing, construction, operation and maintenance of the Project by the District, Rialto and RHWC; (4) the payment for the operation and maintenance of the portion of the Baseline Feeder which is not part of the Project; (5) delivery of water from Valley District to District, City and RHWC; and (6) the ownership of the constituent parts of the Baseline Feeder.

Term - 30 years

End Date: July 1, 2041



**Debt Service Schedule**  
**San Bernardino Valley Municipal Water District**  
**Revenue Certificates of Participation, Series 2011A**  
**(Baseline Feeder Project)**

Item	Sum	Percentage
Rialto's Back-Charge:	\$205,629	2.40%
Net Bond Issuance Cost:	\$0	
Capital Cost:	\$8,359,371	
Net Bond Issuance Cost:	\$0	97.60%
Total Bond Issuance:	\$8,565,000	100.00%

Allocation of Bond Proceeds	
Capital Cost	8,359,371
Rialto Back-Charge	205,629
	8,565,000
	97.60%
	2.40%
	100.00%

Pmt Due	Annual D/S	Annual Equal Collection	Annual Payment			Monthly Payment			
			WVWD	Rialto	Rialto Back Charge	RHWC	WVWD	Rialto	RHWC
7/1/2012	\$497,228.03	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2013	\$504,743.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2014	\$501,443.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2015	\$501,493.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2016	\$506,393.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2017	\$505,993.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2018	\$505,443.76	\$506,452.20	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2019	\$502,843.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2020	\$505,043.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2021	\$506,843.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2022	\$508,243.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2023	\$504,243.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2024	\$505,043.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2025	\$505,443.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2026	\$505,043.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2027	\$505,043.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2028	\$509,243.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2029	\$507,843.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2030	\$506,043.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2031	\$508,843.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2032	\$505,643.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2033	\$506,618.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2034	\$506,956.26	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2035	\$506,656.26	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2036	\$510,718.76	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2037	\$508,437.50	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2038	\$510,500.00	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2039	\$511,687.50	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2040	\$512,000.00	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
7/1/2041	\$511,437.50	\$506,452.19	\$321,528.84	\$160,764.42	\$12,158.93	\$12,000.00	\$26,794.07	\$14,410.28	\$1,000.00
<b>Total D/S</b>	<b>\$15,193,565.77</b>	<b>\$15,193,565.77</b>	<b>\$9,645,865.20</b>	<b>\$4,822,932.60</b>	<b>\$364,767.98</b>	<b>\$360,000.00</b>	<b>\$26,794.07</b>	<b>\$14,410.28</b>	<b>\$1,000.00</b>

## ATTACHMENT NO. 3

## CSCDA SERIES 2600D-2 REVENUE BONDS

A portion of the proceeds of the District's share of the CSCDA Series 2006D-2 Revenue bonds (the "Bonds") is being used to finance improvements to the System, including upgrading, renovation and/or installation of booster plants, wells, reservoirs, pipelines and metering stations, water treatment facilities, including a granulated activated carbon filter for the Treatment Plant, and the acquisition of miscellaneous furniture and equipment and other capital improvements to the System (the "Project") and to refund for debt service savings the \$14,635,000 outstanding amount of the District's portion of the CSCDA Water and Wastewater Revenue Bonds, Series 2004A.

The District's portion of the CSCDA Series 2004A Bonds financed the first phase of an expansion and upgrade of the Treatment Facility. The first phase expanded the production capability of the Treatment Facility from 9.6 to 14.4 mgd. The primary components of the second phase included pretreatment facilities, a chemical building, a pumping station and associated facilities. A third phase will expand the treatment capacity of the Treatment Facility from 14.4 to 20.4 mgd. The District's portion of the CSCDA 2006D-2 Bonds will finance a portion of phase three consisting of a granulated activated carbon filter for the Plant. The principal remaining component of phase three is the construction of additional membrane filtration capacity. The third phase of the Plant improvements and certain other capital improvements are scheduled to be completed over the next three fiscal years and cost an additional \$6.6 million to be funded with District reserves.

Term - 26 years

End Date: October 1, 2032

## Debt Service Schedule

The following table shows the District's debt service requirements related to the CSCDA Series 2006D-2 Bonds.

Annual Period Ending <u>October 1</u>	<u>Principal</u>	<u>Interest</u>	<u>Total</u>
2007	\$ 850,000.00	\$1,256,905.84	\$2,106,905.84
2008	825,000.00	1,333,027.50	2,158,027.50
2009	860,000.00	1,300,027.50	2,160,027.50
2010	895,000.00	1,265,627.50	2,160,627.50
2011	945,000.00	1,229,827.50	2,174,827.50
2012	970,000.00	1,192,027.50	2,162,027.50
2013	1,005,000.00	1,153,227.50	2,158,227.50
2014	1,045,000.00	1,113,027.50	2,158,027.50
2015	1,090,000.00	1,071,227.50	2,161,227.50
2016	1,130,000.00	1,027,627.50	2,157,627.50
2017	1,180,000.00	982,427.50	2,162,427.50
2018	1,225,000.00	937,587.50	2,162,587.50
2019	1,270,000.00	890,118.75	2,160,118.75
2020	1,320,000.00	839,318.75	2,159,318.75
2021	1,375,000.00	786,518.75	2,161,518.75
2022	1,430,000.00	729,800.00	2,159,800.00
2023	1,490,000.00	669,025.00	2,159,025.00
2024	1,555,000.00	605,700.00	2,160,700.00
2025	1,625,000.00	535,725.00	2,160,725.00
2026	1,705,000.00	462,600.00	2,167,600.00
2027	1,780,000.00	385,875.00	2,165,875.00
2028	1,855,000.00	305,775.00	2,160,775.00
2029	1,935,000.00	222,300.00	2,157,300.00
2030	960,000.00	135,225.00	1,095,225.00
2031	1,000,000.00	92,025.00	1,092,025.00
2032	<u>1,045,000.00</u>	<u>47,025.00</u>	<u>1,092,025.00</u>
<b>Total</b>	<b>\$32,365,000.00</b>	<b>\$20,569,599.59</b>	<b>\$52,934,599.59</b>





**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** CONSIDER WATER SYSTEM INFRASTRUCTURE INSTALLATION  
 AND CONVEYANCE AGREEMENT WITH MV AMCV, LLC FOR  
 ARROWHEAD MEADOWS TRACT NO. 18827

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**BACKGROUND:**

MV AMCV, LLC. (“Developer”) is the owner of land located south of San Bernardino Avenue between Spruce Avenue and Idyllwild Avenue in the City of Rialto, known as Tract No. 18827, Arrowhead Meadows (“Development”), as shown in **Exhibit A**. The Development is a private community containing 30 residential lots requiring water services. In developing this land, the Developer is required to construct a new water main within the tract to allow for new domestic and irrigation connections.

**DISCUSSION:**

In order to construct the water facilities needed to supply water to the Development, West Valley Water District (“District”) and the Developer wish to enter into a Developer-Installed Water System Infrastructure Installation and Conveyance Agreement (“Agreement”). This Agreement outlines the responsibilities of the Developer in constructing facilities, including insurance, indemnification and bonding requirements as well as conveyance and acceptance of the water system by the District. Attached as **Exhibit B** is a copy of the Water System Infrastructure Installation and Conveyance Agreement for this development.

**FISCAL IMPACT:**

No fiscal impact to the District.

**STAFF RECOMMENDATION:**

It is recommended that the Engineering, Operations and Planning Committee approve the Water System Infrastructure Installation and Conveyance Agreement with MV AMCV, LLC. and have this item considered by the full Board of Directors at a future meeting.

Respectfully Submitted,



---

Clarence Mansell Jr, General Manager

DG:ce

**ATTACHMENT(S):**

1. Exhibit A - Aerial Map
2. Exhibit B - Water System Infrastructure Installation and Conveyance Agreement with MV AMCV, LLC

# EXHIBIT A





SAN BERNARDINO AVE

IDYLLWILD AVE

SPRUCE AVE

PROJECT AREA

### Exhibit A

### Tract 18827 – Arrowhead Meadows





# EXHIBIT B



## WATER SYSTEM INFRASTRUCTURE INSTALLATION AND CONVEYANCE AGREEMENT

This water system infrastructure installation and conveyance agreement (“Agreement”) is entered into and effective as of \_\_\_\_\_ by and between **MV AMCV, LLC** (“Developer”), and **WEST VALLEY WATER DISTRICT** (“District”) who agree as follows:

The Developer is the owner of certain land described as **TRACT 18827** and as more fully (or further) shown on Exhibit "A". In developing this land, the Developer is desirous of obtaining a public water supply adequate for domestic uses and public fire protection purposes and is desirous of integrating that water system into the District’s public water system.

In order to provide facilities for a water supply to said land, it is the intention of the parties to this Agreement that the Developer shall furnish and install those water mains, fire hydrants, service laterals, water meters and valves, valve boxes, and all other appurtenant fittings and facilities required for a complete water system to serve the land shown on Exhibit "A".

In order to implement the foregoing and in consideration of the terms and conditions herein contained, the parties further agree as follows:

### 1. DESIGN

1.1. Developer shall design and construct, at the Developer's own expense, the water facilities and appurtenances required to serve the development in accordance with final District approved plans known as **WATER IMPROVEMENT PLANS FOR ARROWHEAD MEADOWS TRACT NO. 18827**, as approved and attached herein as Exhibit "B" and in accordance with District-approved design standards and specifications, and the terms and conditions of this Agreement.

1.2. The water system design shall be by a Professional Engineer registered in the State of California, and in accordance with the District's most recent Rules and Regulations (the “Rules and Regulations”), the District's Standards for Domestic Water Facilities and Standard Drawings herein included by reference, all applicable District ordinances and policies and all City, County of San Bernardino, State of California, and Federal laws, ordinances, rules, regulations, codes and other legal requirements of all government bodies having jurisdiction over said construction and property (all of the foregoing requirements in this paragraph being collectively referred to herein at times as “Legal Requirements”).

1.3. The District, at Developer's expense, shall review Developer's plans for the purpose of ensuring the adequacy of the design and conformance with the District's standards and specifications. The District reserves the right to add, delete, modify, change or amend any or all the plans and specifications.

1.4. In the event that the property to be developed includes multiple residential, condominiums, commercial or industrial uses, all site plans, grading plans, and any available plumbing plot plans shall be furnished to the District by Developer.

1.5. The District makes no warranties as to the correctness, accuracy or completeness of the plans and specifications. The accuracy, adequacy, suitability, and correctness of the water system design shall be the sole responsibility of the Developer.

## **2. CONSTRUCTION**

2.1. Developer shall perform, or caused to be performed, all construction of the water system infrastructure installation pursuant to the approved water system plans, and all Legal Requirements.

2.2 The performance of this Agreement shall commence within ninety (90) calendar days from the date of this Agreement and shall be completed within one (1) year from the estimated construction start date.

2.3. Time is of the essence in this Agreement; provided that, in the event good cause is shown therefore, the general manager of the District ("General Manager") may extend the time for completion of the water system installation. Any such extension may be granted without the notice to Developer's surety, and extensions so granted shall not relieve the surety's liability on the bond to secure faithful performance of this Agreement. The General Manager shall be the sole and final judge as to whether or not good cause has been shown to entitle Developer to an extension.

2.4. The Developer and its contractor and subcontractors shall attend a preconstruction meeting with the District at the District's headquarters no less than five (5) working days prior to commencement of construction.

2.5. No work on water facilities shall commence prior to the completion of all required curbs and gutters.

## **3. LICENSES AND PERMITS**

3.1. Developer, and all of Developer's contractors and subcontractors warrants it possesses, or shall obtain, and maintain during the term of this Agreement any and all licenses, permits, qualifications, insurance and approval of whatever nature that are legally required of Developer, its contractors, and all subcontractors to practice its profession, skill or business.

3.2. The work to be performed under this Agreement, except meter installations, shall be performed by Developer, or a contractor or subcontractor who is pre-approved by the District and is licensed under the laws of the State of California in the specialty Class of "C-34" Pipeline or Class "A" General Engineering. A copy of the contract between Developer and the selected pre-approved contractor and all subcontractors shall be submitted to the District for review and approval.

3.3. Excavation/resurfacing permits shall be secured by Developer at Developer's expense. Permits/easements to install, maintain and operate water system facilities in private property shall be secured by Developer at Developer's own expense prior to construction.

3.4. Developer shall, at Developer's own expense, be responsible for obtaining and adhering to a National Pollution Discharge Elimination System (NPDES) permit from the Regional Water Quality Board as required for construction or pipeline flushing and disinfection.

#### 4. INSURANCE REQUIREMENTS

4.1. The following insurance requirements have been adopted by the District and shall be applicable to this Agreement. These requirements supersede the insurance requirements set forth in any other reference of the District, and to the extent of any conflict, the specified requirements herein shall prevail.

4.2. Developer shall ensure that Developer's contractors conform to the following insurance requirements and that all required documents are submitted to the District at the time of Agreement submittal: Developer shall ensure that its contractors and all subcontractors shall purchase and maintain insurance in amounts equal to the requirements set forth in (a) through (d) below, and shall not commence work under this Agreement until all insurance required under this heading is obtained in a form acceptable to the District, nor shall Developer allow any contractor or subcontractor to commence construction pursuant to a contract or subcontract until all insurance required of the contractor and any subcontractors has been obtained.

a. General Liability: Developer shall ensure that its contractor and all subcontractors shall maintain during the life of this Agreement, a standard form of either Comprehensive General Liability insurance or Commercial General Liability insurance ("General Liability Insurance") providing the following minimum limits of liability: Combined single limit of \$1.0 million per occurrence for bodily injury, including death, personal injury, and property damage with \$2.0 million minimum aggregate, separate for this project as evidenced by endorsement. The insurance shall include coverage for each of the following hazards: Premises-Operations; Owners and Contractors Protective; Broad Form Property Damage contractual for Specific Contract; Severability of Interest or Cross-Liability; XCU Hazards; and Personal Injury – With the "Employee" Exclusive Deleted.

b. Automotive/Vehicle Liability Insurance: Developer shall ensure that its contractor and all subcontractors shall maintain a policy of automotive/vehicle liability insurance on a commercial auto liability form covering owned, non-owned and hired automobiles providing the following minimum limits of liability: Combined single limit of liability of \$1.0 million per accident for Bodily Injury, Death and Property Damage ("Automotive/Vehicle Liability Insurance").

c. Workers' Compensation Insurance: Developer shall ensure that its contractor and all subcontractors shall provide such workers' compensation insurance with statutory minimum amounts of coverage, as required by the California *Labor Code* and other applicable law, and including employer's liability insurance with a minimum limit of \$1,000,000.00 ("Workers' Compensation Insurance"). Such Workers' Compensation Insurance shall be endorsed to provide for a waiver of subrogation against the District.

d. Excess Liability: Developer shall ensure that its contractor and all subcontractors shall provide a policy providing excess coverage in a face amount necessary when

combined with the primary insurance, to equal the minimum requirements for General Liability Insurance and Automotive/Vehicle Liability Insurance.

4.3. The insurances provided for in Section 4.2 and its subsections above are subject to all of the following conditions:

a. The insurance shall be issued and underwritten by insurance companies acceptable to the District, and shall be licensed by the State of California to do business on the lines of insurance specified. The insurers must also have an "A-" Policyholder's rating" and a "financial rating" of at least Class VII in accordance with the most current A.M. Best's Rating Guide.

b. Developer's contractor and subcontractors may satisfy the limit requirements in a single policy or multiple policies. Any such additional policies written as excess insurance shall not provide any less coverage than that provided by the first or primary policy.

c. Any costs associated with a self-insured program, deductibles, or premium rating programs that determine premium based on loss experience shall be for the account of Developer, Developer's contractor and subcontractors, and the District shall not be required to participate in any such loss. If any such programs exist, Developer, Developer's contractor and subcontractors, agree to protect and defend the District in the same manner as if such cost provisions were not applicable.

d. Developer shall ensure that its contractor and all subcontractors shall have presented at the time of execution of the Agreement, the original policies of insurance and a certificate of insurance naming the District as the certificate holder and that such coverage is in force and complies with the terms and conditions outlined herein.

e. If an insurance policy contains a general policy aggregate of less than the minimum limits specified, then the policy coverage shall be written with limits applicable solely to this Agreement, as specified, and shall not be reduced by or impaired by any other claims arising against Developer. These policy limits shall be set forth by separate endorsement to the policy.

4.4. Each such policy of General Liability Insurance and Automotive/Vehicle Liability Insurance shall contain endorsements providing the following:

a. The District, their board members, officers, agents, employees, consultants, and engineers, are hereby declared to be additional insureds under the terms of this policy, but only with respect to the operations of the Developer at or upon any of the premises of the District in connection with the Agreement with the District, or acts or omissions of the additional insureds in connection with, but limited to its general supervision or inspection of said operations and save for any claims arising from the sole negligence or sole willful misconduct the District.

b. No policy shall be canceled, limited, materially altered, or non-renewed by the insurer until thirty (30) days after receipt by the District of a written notice of such cancellation or reduction in coverage.

c. This insurance policy is primary insurance and no insurance held or owned by the designated additional insureds shall be called upon to cover a loss under this policy.

## 5. BONDING REQUIREMENTS

5.1. Developer shall generate an engineer's cost estimate based on the water system plans provided to the District. The estimated costs, attached herein as Exhibit "C", will be submitted to the District for review and approval, and shall be used as the basis for bonding requirements for the water system described in the plans provided to the District by the Developer and approved for construction by the District. The sole intent and purpose of the engineer's estimate is to establish a cost valuation for bonding purposes only.

5.2. Performance Bond: The Developer's engineers estimate for the **WATER IMPROVEMENT PLANS FOR ARROWHEAD MEADOWS TRACT NO. 18827**, is **THREE HUNDRED THOUSAND DOLLARS AND 00/100 (\$300,000.00)**. Developer shall and by this Agreement does guarantee the Developer's faithful performance of this Agreement and all of its terms and conditions by providing the following: Developer shall provide the District with either an irrevocable letter of credit from a recognized financial institution acceptable to the District or a performance bond, from a surety institution licensed by the State of California and authorized to do and doing business in said State, valid and renewable until such improvements are accepted by the District. The irrevocable letter of credit or performance bond shall be in the amount of **THREE HUNDRED THOUSAND DOLLARS AND 00/100 (\$300,000.00)**, equal to 100 percent of the approved Developer's estimate.

5.3. Warranty Bond: The Developer's pre-approved contractor shall furnish a two-year warranty bond for all work completed in accordance with the approved plans (Exhibit "B"). Before District's acceptance of the completed water facilities and appurtenances, such facilities and appurtenances shall be free from any and all liens and encumbrances and free from any and all defects in the materials or construction thereof. The two-year warranty shall be either an irrevocable letter of credit from a recognized financial institution acceptable to the District or a warranty bond beginning on the date of acceptance of the water facilities by the District.

## 6. MATERIALS

6.1. The water system facilities to be installed pursuant to this Agreement shall become an extension of the distribution system of the District. All materials used must conform to District specifications for such materials pursuant to all applicable Legal Requirements.

## 7. NOTICES

7.1. All notices herein required shall be in writing, and delivered in person or sent by registered mail, postage prepaid.

7.2. Notices required shall be given to the **District** addressed as follows:

WEST VALLEY WATER DISTRICT  
Attn: GENERAL MANAGER  
POST OFFICE BOX 920  
RIALTO, CA 92377

*RE: Water Improvement Plans for Arrowhead Meadows Tract No. 18827*



- 7.3. Notices required shall be given to **Developer** addressed as follows:

MV AMCV, LLC  
ATTENTION: STEVEN LANDIS  
8628 HILLSIDE RD.  
ALTA LOMA, CA 91701  
*RE: Water Improvement Plans for Arrowhead Meadows Tract No. 18827*

- 7.4. Notices required shall be given to **Surety** addressed as follows:

SURETY NAME:  
ATTN TO:  
ADDRESS  
*RE: Water Improvement Plans for Arrowhead Meadows Tract No. 18827*

7.5. Provided that any party or Surety may change such address by notice in writing to the other party, and thereafter, notices shall be addressed and transmitted to the new address.

7.6. The Developer or its contractor shall provide the District forty-eight (48) hours advance notice of request for inspection or testing.

- 7.7. The District is closed on the holidays listed in Exhibit "D".

## **8. NOTICE TO PROCEED TO CONSTRUCT WATER SYSTEM FACILITIES**

8.1. Upon acceptance of the insurance and aforementioned bonds and/or irrevocable letters of credit in the amounts provided herein and approval by the District and upon payment of all applicable charges, the Agreement shall be signed by Developer and the District. The District shall return an original copy of the signed Agreement with a letter to Developer giving notice to proceed to construct the water system facilities.

## **9. INSPECTION**

9.1. It is understood that the sole purpose and intent of the District's inspection and testing is to validate that the materials, workmanship, and construction of the water facilities are in compliance with the District-approved final plans, the District's Rules and Regulations, the Standards for Domestic Water Facilities, the Standard Drawings, and all other applicable District requirements. Developer acknowledges and represents that it assumes full and sole responsibility for the safety and management of the project.

9.2. Developer shall at all times maintain proper facilities and provide safe access for inspection by the District to all parts of the work and to the shops wherein the work is in preparation. Additionally, in connection with the performance of this Agreement, the District shall have the authority to enter the work site at any time for the purpose of identifying the existence of conditions, either actual or threatened, that may present a danger of hazard to any and all employees. Developer agrees that the District, in its sole authority and discretion, may order the immediate abatement of any and all conditions that may present an actual or threatened danger or hazard to any and all employees at the work site. Furthermore, Developer acknowledges the

provisions of California *Labor Code* Section 6400 et seq., which requires that employers shall furnish employment and a place of employment that is safe and healthful for all employees working therein. In the event the District identifies the existence of any condition that presents an actual or threatened danger or hazard to any or all employees at the work site, the District is hereby authorized to order an immediate abatement of that condition.

9.3. All work and materials shall be subject to inspection, testing, and acceptance by the District at Developer's expense. In the event Developer arranges to have materials fabricated for the project, Developer may be required to arrange for the District to inspect that material during fabrication at Developer's expense.

9.4. All material fabrications shall be preapproved by the District and must conform to District standards and specifications.

9.5. The District's inspectors shall have full, unlimited access to perform continuous inspection and have the authority to stop work at any time, by written notice, without any liability whatsoever to the District, if, in the inspectors' judgment, the work called for by this Agreement, or the District approved plans, or the specifications is not being installed or performed in a satisfactory and workmanlike manner according to District's standards and specifications and/or in the event the materials do not comply with the District's standards and specifications.

9.6. Final acceptance of all material to be purchased or fabricated by Developer under this Agreement shall be made only with the prior approval of the District. Approval by the District, however, shall not operate to relieve the material supplier or Developer of any guarantees, warranties, or the duty of compliance with any of the requirements of the approved plans and specifications or of this Agreement. All construction pursuant to this Agreement shall be inspected pursuant for conformity with District requirements. Developer shall pay actual costs for inspections.

## **10. TESTING AND DISINFECTION**

10.1. All water system facilities and components constructed pursuant to this Agreement shall adhere to all requirements for testing, disinfection, and flushing pursuant to District standards and Legal Requirements.

## **11. RELOCATIONS, RECONSTRUCTIONS, AND DAMAGES**

11.1. Developer accepts the responsibility for and the costs occasioned by any reconstruction, relocation, damages to, or changes of water services or facilities caused or contributed to directly or indirectly by any subsequent changes in the location of any of said facilities or water meters or water services.

## **12. AS-CONSTRUCTED DOCUMENTATION**

12.1. In order for the District to accept the facilities, Developer shall provide all required documentation as specified in the Standards for Domestic Water Facilities, including As-Built drawings.

### **13. INDEMNIFICATION**

13.1. Developer hereby agrees to and shall protect, defend, indemnify and hold the District and its board members, officers, agents, employees, and engineers free and harmless from any and all liability losses, damages, claims, liens, demands and cause of action of every kind and character including, but not limited to, the amounts of judgments, penalties, interests, court costs, attorney's/legal fees, and all other expenses incurred by the District arising in favor of any party, including claims, liens, debts, demands for lost wages or compensation, personal injuries, including employees or the District, death or damages to property (including property of the District) and without limitation by enumeration, all other claims or demands of every character occurring or in any way incident to, in connection with or arising directly or indirectly out of the obligations herein undertaken or out of the operations conducted by Developer save and except claims or litigation arising through the sole negligence or sole willful misconduct of the District or the District's agents and employees. Developer shall investigate, handle, respond to, provide defense for and defend any such claims, demand, or suit at the sole expense of Developer even if the claim or claims alleged are groundless, false or fraudulent. Developer agrees to, and shall defend the District and its members, directors, officers, agents, employees, and engineers from any suits or actions at law or in equity for damages caused, or alleged to have been caused, by reason of any of the aforesaid operations, provided as follows:

a. That the District does not and shall not waive any rights against Developer which it may have by reason of the aforesaid hold harmless agreement, because of the acceptance by the District, or the deposit with District by Developer, or any of the insurance policies described in this Agreement.

b. That the aforesaid hold harmless agreement by Developer shall apply to all damages and claims for damages of every kind suffered, or alleged to have been suffered, by reason of any or the aforesaid operations referred to in this subsection, regardless of whether or not District has prepared, supplied water system installation, or regardless of whether or not such insurance policies shall have been determined to be applicable to any such damages or claims for damages.

This provision is not intended to create any cause of action in favor of any third party against Developer or the District or to enlarge in any way Developer's liability but is intended solely to provide for indemnification of the District from liability for damage or injuries to third persons or property arising from Developer's performance hereunder.

13.2. Neither Developer nor any of Developer's agents, contractors or subcontractors are, or shall be, considered to be agents of the District in connection with the performance of Developer's obligations under this Agreement.

### **14. REPAIR OR RECONSTRUCTION OF DEFECTIVE WORK**

14.1. If, within a period of two years after final acceptance of the work performed under this Agreement, any structure or part of any structure furnished and/or installed or constructed, or caused to be installed or constructed by Developer, or any of the work done under this Agreement, fails to fulfill any of the requirement of this Agreement or the specifications referred to herein, Developer shall, without delay and without any cost to District, repair or replace or reconstruct

any defective or otherwise unsatisfactory part or parts of the work structure. Should Developer fail to act promptly or in accordance with this requirement, or should the exigencies of the situation as determined by the District in the exercise of its sole discretion require repair, replacement or reconstruction before Developer can be notified, District may, at its option, make the necessary repairs or replacements or perform the necessary work, and Developer shall pay to the District the actual cost of such repairs.

## **15. COSTS AND FEES**

15.1. Developer shall be responsible for all fees and deposits as required by the District. All fees and deposits shall be paid in full prior to the execution of this Agreement and before construction can take place.

15.2. Any additional costs and fees shall be paid in full prior to conveyance and acceptance of the water system.

## **16. CONVEYANCE AND ACCEPTANCE OF WATER SYSTEM**

16.1. Upon completion of the water system in accordance with the approved water plans and submission of the required documentation, the Developer shall convey the water system to the District.

16.2. The Developer shall be responsible for insuring the pre-approved contractor furnish an irrevocable letter of credit to the District or a warranty bond (One Hundred (100%) of Developer's estimate) for a period of two years as stated in Sections 5.3 of this Agreement, as-built drawings with contractor redlines and AutoCAD files, materials list with quantities, labor, equipment, and materials, water system cost breakouts, compaction test report signed and sealed by a California Registered Engineer, notice of completion filed with San Bernardino County Recorder, fire flow tests of all hydrants, all required easements for water facilities and unconditional financial release from subcontractors and material providers, Upon compliance with all the terms and conditions of this Agreement, the District shall prepare the conveyance agreement accepting the water facilities and forward same to the address provided herein. Title to the ownership of said facilities and appurtenances shall thereby be conveyed to the District. The District shall thereafter operate and maintain said facilities so as to furnish water service to the development (Exhibit "A") in accordance with the District's ordinances, policies and Rules and Regulations.

## **17. PERMANENT WATER SERVICE**

17.1. In no event shall permanent water services be provided to Developer's installed system until all applicable charges and fees have been paid by Developer and all facilities have been conveyed, free of all encumbrances, to the District, including any easements which may be required. Such conveyance shall occur in a timely manner in accordance with the terms of this Agreement.

## **18. BREACH OR DEFAULT OF AGREEMENT**

18.1. If Developer refuses or fails to obtain prosecution of the work, or any severable part thereof, with such diligence as will insure its completion within the time specified, or any extension thereof, or fails to obtain completion of said work within such time, or if Developer should be adjudged as bankrupt, or Developer should make a general assignment for the benefit of Developer's creditors, or if a receiver should be appointed in the event of Developer's insolvency, or if Developer, or any of Developer's contractors, subcontractors, agents or employees, should violate any of the provisions of this Agreement, the District's General Manager or the General Manager's designee may serve written notice upon Developer and Developer's surety of breach of this Agreement, or of any portion therefore, and default of Developer.

18.2. In the event of any such notice, Developer's surety shall have the duty to take over and complete the work and the improvement herein specified; provided, however, that if the surety, within five (5) days after the serving upon of such notice of breach, does not give the District written notice of its intention to take over the performance of the contract, and does not commence performance thereof within five (5) days after notice to the District of such election, District may take over the work and prosecute the same to completion, by contract or by any other method District may deem advisable, for the account and at the expense of Developer, and Developer's surety shall be liable to the District for any excess cost or damages occasioned District thereby; and, in such event, District, without liability for so doing, may take possession of, and utilize in completing the work, such materials, appliances, plant and other property belonging to Developer as may be on the site of the work and necessary therefore.

## **19. SUCCESSORS BOUND**

19.1. This Agreement shall be binding upon and inure to the benefit of each of the parties and their respective legal representatives, successors, heirs, and assigns.

## **20. ENFORCEMENT OF PROVISIONS**

20.1. The District's failure to enforce any provisions of this Agreement or the waiver thereof in any instance shall not be construed as a general waiver or relinquishment on its part of any such provision, but the same shall nevertheless be and remain in full force and effect.

[CONTINUED ON NEXT PAGE]



IN WITNESS WHEREOF, the parties hereto execute this Agreement.

**WEST VALLEY WATER DISTRICT**

By: \_\_\_\_\_  
Clarence C. Mansell, Jr., General Manager

Date: \_\_\_\_\_

**DEVELOPER:**

**MV AMCV, LLC**  
**A Limited Liability Company**

By: \_\_\_\_\_  
Steven Landis  
Authorized Agent

Date: \_\_\_\_\_

# Exhibit A





SAN BERNARDINO AVE

IDYLLWILD AVE

SPRUCE AVE

PROJECT AREA



### Exhibit A

### Tract 18827 – Arrowhead Meadows



# Exhibit B

**GENERAL CONSTRUCTION NOTES**

1. ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH WEST VALLEY WATER DISTRICT'S STANDARDS FOR DOMESTIC WATER FACILITIES AS OF THE DATE OF PLAN APPROVAL.
2. THE CONTRACTOR SHALL ARRANGE FOR A PRE-CONSTRUCTION CONFERENCE WITH WEST VALLEY WATER DISTRICT AND THE ENGINEER AT LEAST ONE WEEK PRIOR TO BEGINNING CONSTRUCTION.
3. THE CONTRACTOR'S ATTENTION IS EXPRESSLY DIRECTED TO ALL THE REQUIREMENTS AND PROVISIONS OF THE STATE OF CALIFORNIA SAFETY CODE, CHAPTER 18510, WHICH SHALL BE STRICTLY OBSERVED THROUGHOUT THE ENTIRE DURATION OF THE CONTRACT. ANY EXCAVATION PERMIT SHALL BE REQUIRED FOR TRENCHES IN EXCESS OF 5.0 FEET IN DEPTH.
4. CONTRACTOR AGREES THAT HE SHALL ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE CONDITIONS DURING THE COURSE OF CONSTRUCTION OF THIS PROJECT, INCLUDING SAFETY OF ALL PERSONS ON THE JOB SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING AND HOLDING THE OWNER, THE ENGINEER, AND HIS REPRESENTATIVE HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING FOR LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE OWNER OR THE ENGINEER.
5. ANY CONTRACTOR PERFORMING WORK ON THIS PROJECT SHALL FAMILIARIZE HIMSELF WITH THE SITE AND SHALL BE SOLELY RESPONSIBLE FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING DIRECTLY OR INDIRECTLY FROM THE OPERATIONS, WHETHER OR NOT SUCH FACILITIES ARE SHOWN ON THESE PLANS.
6. THE CONTRACTOR SHALL UNCOVER AND VERIFY THE LOCATION AND DEPTH OF ALL EXISTING UTILITY LINES PRIOR TO EXCAVATING. THE CONTRACTOR SHALL MAKE APPROPRIATE ARRANGEMENTS FOR THE PROTECTION OF ALL UTILITIES. THE CONTRACTOR SHALL NOTIFY UNDERGROUND SERVICE ALERT AT 1-800-227-2600 PRIOR TO BEGINNING UNDERGROUND SERVICE ALERT AT 1-800-227-2600 PRIOR TO BEGINNING WORK.
7. THE CONTRACTOR SHALL DISPOSE OF ALL SURPLUS EXCAVATION OUTSIDE OF THE PROJECT AREA.
8. PIPE TRENCH SHALL BE EXCAVATED TRUE TO LINE AND GRADE IN ACCORDANCE WITH THE PLAN AND SPECIFICATIONS. ALL BACKFILL SHALL BE PLACED IN A MANNER SATISFACTORY TO THE ENGINEER AND IN ACCORDANCE WITH THE STANDARDS. MATERIAL FOR BACKFILL TO TWELVE (12) INCHES ABOVE THE PIPE SHALL BE GRANULAR MATERIAL WITH A MINIMUM SAND EQUIVALENT OF 30.
9. NO PRELINE SHALL BE INSTALLED ON FILL MATERIAL WITHOUT FIRST MEETING IN-PLACE DENSITY TESTS. COMPACTION IN INTERMEDIATE ZONE SHALL BE COMPACTED TO 90 % RELATIVE COMPACTION.
10. COMPACTION TESTS SHALL BE REQUIRED FOR ALL TRENCH BACKFILL AND/OR THE REQUIREMENTS OF ANY AGENCY HAVING JURISDICTION.
11. THE CONTRACTOR SHALL REPLACE IN KIND TO THE SATISFACTION OF THE ENGINEER ANY AND ALL UTILITIES, INCLUDING BUT NOT LIMITED TO: ROAD BASE PAVING, CURB OR GUTTER OR OTHER IMPROVEMENTS CUT, REMOVED OR DAMAGED IN CONNECTION WITH THIS PROJECT.
12. PIPE DELIVERED TO THE SITE SHALL BE PROTECTED BY THE CONTRACTOR FROM DUST OR OTHER CONTAMINATION PRIOR TO PLACING IN TRENCH AND SHALL BE INSTALLED IN ACCORDANCE WITH DISTRICT STANDARDS TO THE SATISFACTION OF THE DISTRICT'S INSPECTOR.
13. THE CONTRACTOR, AT THE END OF EACH DAY'S WORK, SHALL ENSURE THAT ALL OPENINGS INTO THE PIPELINE ARE SECURELY PLUGGED AND STOPPED SO THAT NO ANIMAL, FOWL OR RODENT CAN ENTER THE PIPELINE.
14. ALL WORK SHALL BE INSPECTED BY THE WEST VALLEY WATER DISTRICT OR ITS DULY AUTHORIZED AGENT. THE CONTRACTOR SHALL NOT PROCEED WITH ANY WORK UNLESS THE WORK HAS BEEN INSPECTED AND APPROVED. INSPECTION SHALL BE MADE OF THE FOLLOWING PHASES OF WORK:
  - TRENCHING, INSTALLATION OF PIPE VALVES,
  - FITTINGS, VALVES, BACKFILL AND COMPACTION,
  - LEAKAGE TESTING,
  - VALVES AND VALVE BOXES RAISED TO GRADE,
  - PIPES FLUSHED AND FINAL INSPECTION.
15. THE CONTRACTOR SHALL GIVE AT LEAST 2 WORKING DAYS NOTICE WHEN INSPECTIONS OR ENGINEERING JUDGMENTS BECOME NECESSARY AS SET FORTH IN THE STANDARD SPECIFICATIONS.

**OWNER/DEVELOPER:**

MY AMCO, LLC  
8028 TULOCK ROAD  
SAN ANTONIO, CA 78229  
(951) 231-7206

**CIVIL ENGINEER:**

ALLARD ENGINEERING  
16866 SEVILLE AVENUE  
FONTANA, CA 92335  
(909) 356-1815

**SOILS ENGINEER:**

ZS ENGINEERING  
113 TOMATO SPRINGS  
IRVINE, CA 92618  
PH: 949-331-3232  
OCTOBER 31, 2019  
#191003

**PRIVATE ENGINEER'S NOTICE TO CONTRACTOR:**

THE EXISTENCE AND LOCATION OF ANY UNDERGROUND UTILITY PIPES AND/OR STRUCTURES SHOWN ON THESE PLANS WERE OBTAINED BY A SEARCH OF THE AVAILABLE RECORDS. THESE LOCATIONS ARE APPROXIMATE AND SHALL BE CONFIRMED BY THE CONTRACTOR, SO THAT ANY NECESSARY ADJUSTMENT CAN BE MADE IN ALIGNMENT AND/OR GRADE OF THE PROPOSED IMPROVEMENT. THE CONTRACTOR IS REQUIRED TO TAKE ALL NECESSARY PRECAUTIONS TO PROTECT ANY UTILITY LINES SHOWN ON THESE PLANS. ANY OTHER LINES NOT ON RECORD OR NOT SHOWN ON THESE PLANS.

CONSTRUCTION CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, HE WILL BE REQUIRED TO ASSUME SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE SAFETY, INCLUDING THE SAFETY OF PERSONS AND PROPERTY. THE CONTRACTOR SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS. CONSTRUCTION CONTRACTOR FURTHER AGREES TO DEFEND, INDEMNIFY AND HOLD DESIGN PROFESSIONAL HARMLESS FROM ANY AND ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF THE DESIGN PROFESSIONAL.

**WATER NOTES**

1. PIPE 10" AND SMALLER SHALL BE CLASS 350 DUCTILE PIPE, OR CLASS 150, 10 GAUGE, CEMENT MORTAR LINED AND COATED STEEL PIPE. PIPE LARGER THAN 12" SHALL BE THICKNESS CLASS 50 DUCTILE IRON PIPE, OR CLASS 150, 10 GA. CEMENT MORTAR LINED AND COATED STEEL PIPE.
2. WATER SERVICE LATERALS SHALL BE TYPE K COPPER LINE, MINIMUM 1" DIAMETER, WITH 1" X 1" ANGLE VALVES HAVING LOCK WING. THERE SHALL BE A SEPARATE SERVICE FOR EACH LOT BEING SERVED. ALL SERVICE VALVES SHALL BE 360° TURN (LESS STOP).
3. ALL WATER SERVICE LATERALS SHALL BE INSTALLED AT THE SAME TIME AS MAIN LINE. NO SPICE SHALL BE ALLOWED ON COPPER SERVICE LATERAL LINE.
4. WATER SERVICE LATERALS SHALL BE TERMINATED 12" BEHIND REAR OF CURB, OR 12" BEHIND SIDEWALK AND SHALL BE INSTALLED IN ACCORDANCE WITH DISTRICT'S STANDARD DRAWINGS.
5. FIRE HYDRANTS SHALL BE 6" X 4" X 2-1/2" CLOW MODEL 860 OR EQUAL, PAINTED PER SPECIFICATION WITH YELLOW FINISH COLOR. THE 4" OUTLET SHALL BE PERPENDICULAR TO THE CURB OR FUTURE CURB.
6. DEPTH OF COVER FOR WATER SERVICE LATERALS SHALL BE 30" MINIMUM, FOR WATER MAIN 10" AND SMALLER SHALL BE 36" MINIMUM, FOR WATER MAIN 12" AND LARGER SHALL BE 42" MINIMUM OR AS SPECIFIED ON PLANS. ALL MEASUREMENTS FROM FINISH GRADE.
7. CONCRETE THRUST BLOCKS SHALL BE INSTALLED AT ALL PIPE BENDS (WHERE PIPE CHANGES IN DIRECTION MORE THAN 10°) AND FITTINGS, IN ACCORDANCE WITH DISTRICT'S STANDARD DRAWINGS.
8. AN AIR RELEASE VALVE SHALL BE INSTALLED AT EVERY HIGH POINT IN THE SYSTEM. BOTTOM-OFF ASSEMBLY SHALL BE INSTALLED AT EVERY LOW POINT IN THE SYSTEM.
9. A VALVE BOX AND COVER SHALL BE INSTALLED AT EACH VALVE WHICH IS SET IN THE GROUND. THE CONTRACTOR SHALL BE RESPONSIBLE FOR SETTING VALVE BOXES TO GRADE AFTER FINAL GRADING OR PAVING OPERATION.
10. VALVES 12-INCHES AND LARGER SHALL BE OF BUTTERFLY VALVES. VALVES 10-INCHES AND SMALLER SHALL BE OF WEDGE GATE VALVES. VALVES SHALL BE WATED FOR 150 P.S.I. OPERATION PRESSURE AND SHALL HAVE FLANGED ENDS. SPECIAL FLANGE ADAPTOR SHALL BE FINISHED FOR CONNECTING VALVES TO PIPE AND PIPE FITTING.
11. ALL NEW WATER FACILITIES IMPROVEMENTS SHALL BE TESTED AND DISINFECTED PRIOR TO CONNECTING TO EXISTING WATER SYSTEM, PER AMWA 6801. CONTRACTOR SHALL FURNISH AND INSTALL TEMPORARY BULKHEADS AS REQUIRED FOR PRESSURE TESTING.
12. WATER SERVICE IS SUBJECT TO THE CURRENT DISTRICT'S RULES AND REGULATIONS AND ANY AMENDMENTS THEREOF.
13. IF CONSTRUCTION HAS NOT COMMENCED WITHIN TWO (2) YEARS OF THE PROJECT COMPLETION DATE, THIS PLAN SHALL BE RESUBMITTED TO THE DISTRICT FOR REVIEW AND APPROVAL.
14. CONSTRUCTION TO BE IN ACCORDANCE WITH THE WEST VALLEY WATER DISTRICT STANDARDS FOR DOMESTIC WATER FACILITIES.
15. WATERLINES TO BE CONSTRUCTED ONLY AFTER THE CONSTRUCTION OF CONCRETE CURB & GUTTER.
16. CONTRACTOR TO FURNISH 2-YEAR WARRANTY BOND FOR ALL WATER FACILITIES INSTALLED WITH THIS PLAN.

**DESIGN**

THIS CERTIFIES THAT THESE PLANS AND SPECIFICATIONS HAVE BEEN DESIGNED UNDER THE DIRECT SUPERVISION OF A CIVIL ENGINEER LICENSED IN STATE OF CALIFORNIA AND ARE IN ACCORDANCE WITH TITLE 22, CODE OF REGULATIONS CHAPTER 16, CALIFORNIA WATERWORKS STANDARD OF THE STATE OF CALIFORNIA.

SIGNATURE OF DESIGN ENGINEER \_\_\_\_\_ DATE \_\_\_\_\_

**FIRE**

FIRE PROTECTION SYSTEM REVIEWED AND APPROVED BY:  
CITY OF RIALTO

**WATER**

THIS CERTIFIES THAT THESE PLANS AND SPECIFICATIONS HAVE BEEN REVIEWED BY AND ACCEPTED BY THE WEST VALLEY WATER DISTRICT AND THAT THE DISTRICT IS WILLING AND ABLE TO SUPPLY WATER TO SERVE THIS LOCATION.

SIGNATURE \_\_\_\_\_ TITLE \_\_\_\_\_ DATE \_\_\_\_\_

**UNAUTHORIZED CHANGES AND USES:**

THE ENGINEER PREPARING THESE PLANS WILL NOT BE RESPONSIBLE FOR OR LIABLE FOR UNAUTHORIZED CHANGES TO OR USES OF THESE PLANS. ALL CHANGES TO THE PLANS MUST BE IN WRITING AND MUST BE APPROVED BY THE PREPARER OF THESE PLANS.

**FIRE FLOW REQUIREMENTS**

1. FIRE FLOW REQUIREMENTS: 5000 GPM @ 20 PSI FOR 4 HOURS. 75 % REDUCTION FOR FULLY SPRINKLERED SITE 1250 GPM @ 20 PSI FOR 4 HOURS

**FIRE DEPARTMENT NOTES:**

- 1) FIRE-SAFETY AND EXITING FROM EXISTING OCCUPIED AREAS, BUILDINGS AND PEDESTRIAN WAYS SHALL BE MAINTAINED DURING DEMOLITION AND CONSTRUCTION AS REQUIRED BY UFC, ARTICLE 87.
- 2) THE FIRE PREVENTION DIVISION MUST BE CONTACTED A MINIMUM OF 3 DAYS IN ADVANCE FOR SCHEDULE INSPECTIONS.
- 3) UPON COMPLETION OF ALL INSTALLATION AND TESTING, THE CONTRACTOR SHALL PROVIDE TO THE AUTHORITY HAVING JURISDICTION AND THE BUILDING OWNER A COMPLETED AND SIGNED, CONTRACTOR'S MATERIALS AND TEST CERTIFICATE - NFPA 24, SEC. 9-2

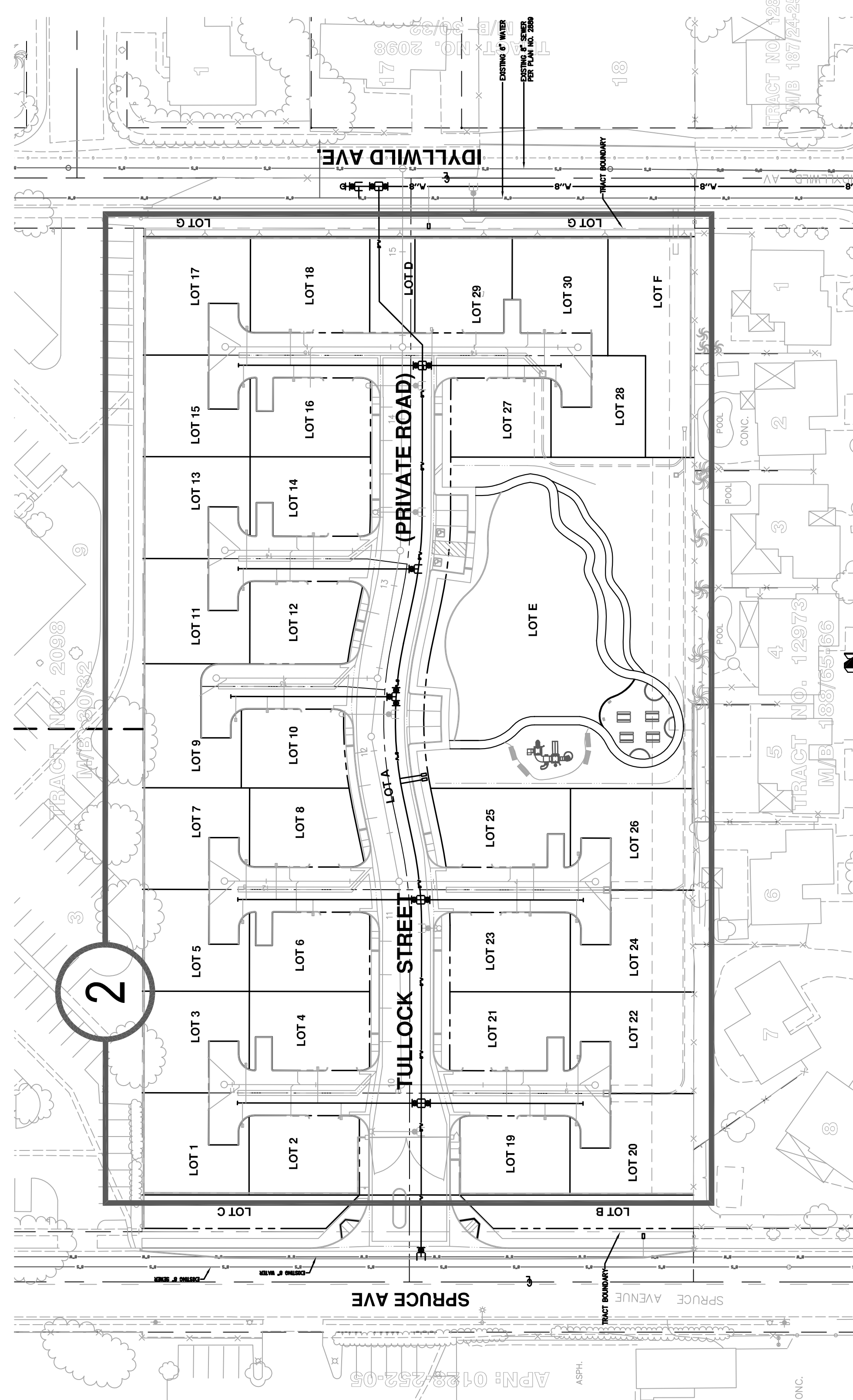
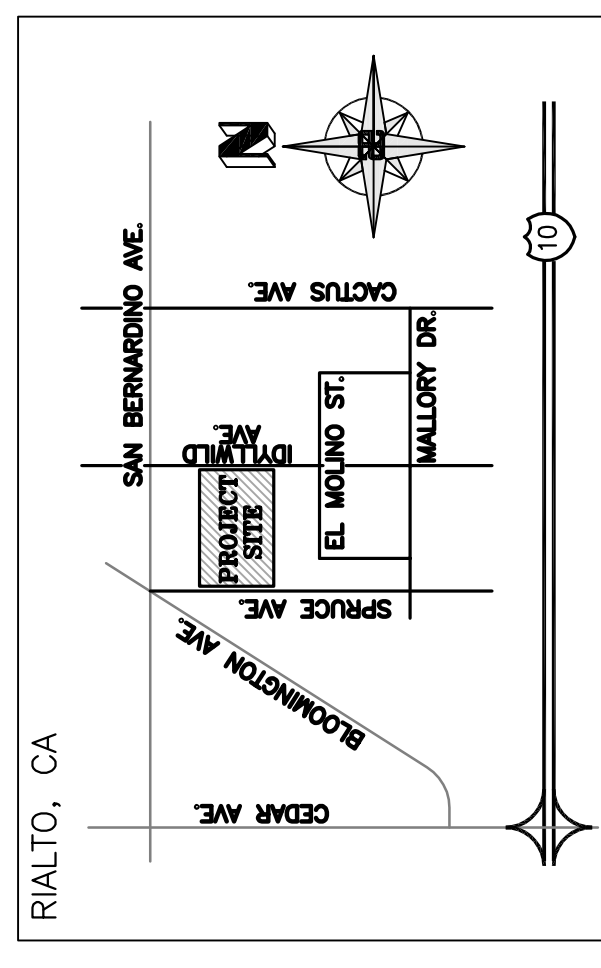
**DUCTILE IRON NOTES:**

1. ALL DUCTILE IRON PIPE SHALL BE INTERNALLY RESTRAINED PER WWMO STD. W-30
2. ALL DUCTILE IRON BENDS & FITTINGS SHALL BE MECHANICALLY RESTRAINED.
3. INSPECTOR SHALL DETERMINE IN FIELD IF ADDITIONAL THRUST BLOCKS OR RESTRAINTS SHALL BE REQUIRED.

BENCH MARK: CITY OF RIALTO NO. 019-88  
BRASS DISC SET IN NE CORNER OF P.C.C. CATCH BASIN, 7' EAST OF CURB, 28' EAST OF CENTERLINE OF SPRUCE AVE., 88' SOUTH OF CENTERLINE OF SAN BERNARDINO AVE.  
(USG & GS DATUM OF 1928)  
ELEVATION = 1121.978 FEET

**BASIS OF BEARINGS:**

THE BEARING SHOWN HEREON ARE BASED ON THE CENTERLINE OF SPRUCE AVE., BEING NORTH OF 177° 45' 00" WEST. BEARING SHOWN ON THE MAP IS FROM THE NORTH SIDE OF SPRUCE AVE. BEARING SHOWN ON THE MAP OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA.



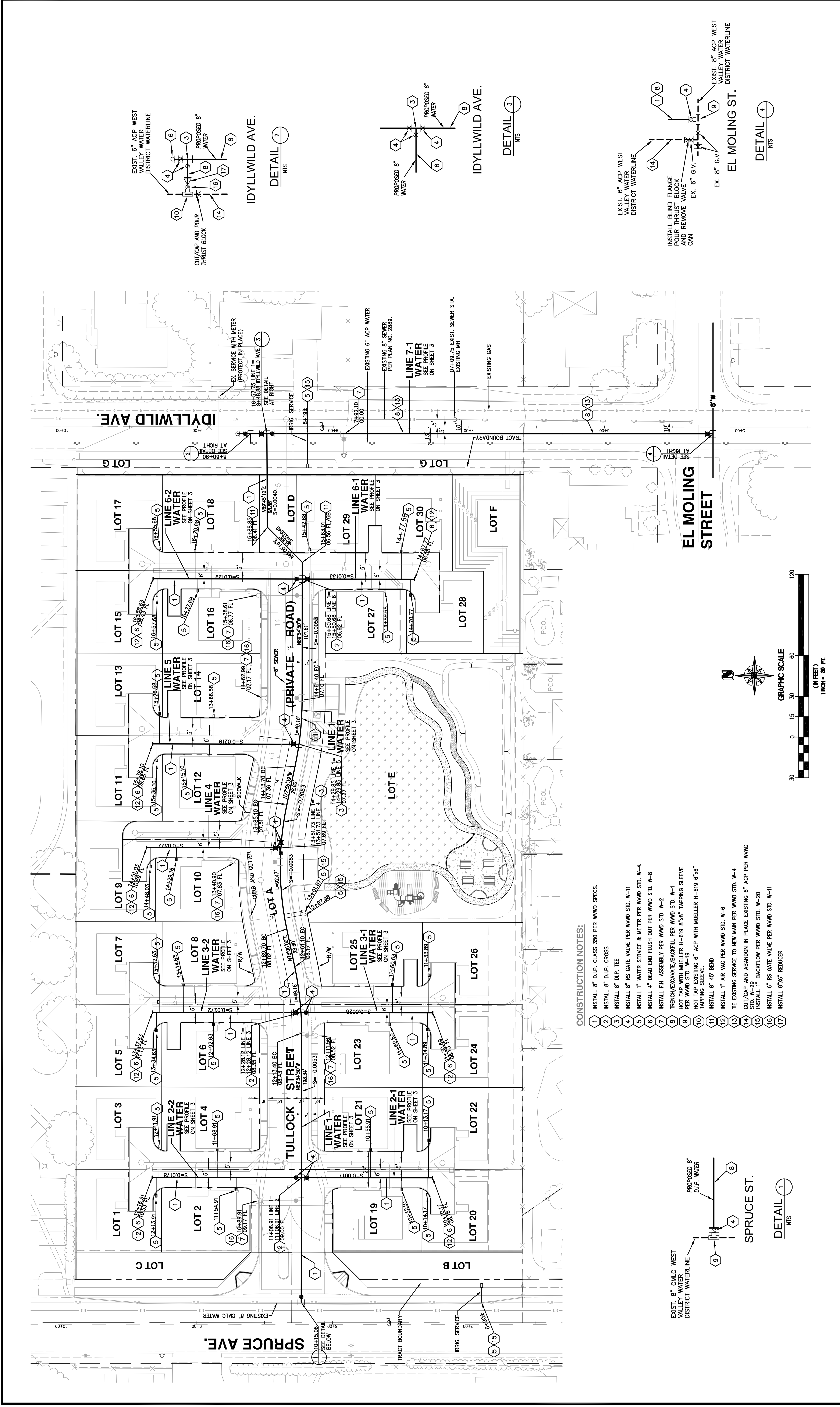
**QUANTITIES**

- CONSTRUCTION NOTES:**
1. INSTALL 8" D.I.P. CLASS 350 PER WWMO SPECS. 1830 LF
  2. INSTALL 8" D.I.P. CROSS 3 EA
  3. INSTALL 8" D.I.P. TEE 4 EA
  4. INSTALL 8" RS GATE VALVE PER WWMO STD. W-11 17 EA
  5. INSTALL 1" WATER SERVICE & METER PER WWMO STD. W-4. 34 EA
  6. INSTALL 4" DEAD END FLUSH OUT PER WWMO STD. W-8 9 EA
  7. INSTALL F.H. ASSEMBLY PER WWMO STD. W-2 6 EA
  8. TRENCH/EXCAVATE/BACKFILL PER WWMO STD. W-1 1830 LF
  9. HOT TAP WITH MUELLER H-619 6"x6" TAPPING SLEEVE PER WWMO STD. W-19 2 EA
  10. HOT TAP EXISTING 6" ACP WITH MUELLER H-619 6"x6" TAPPING SLEEVE 1 EA
  11. INSTALL 6" 45° BEND 2 EA
  12. INSTALL 1" AIR VAC PER WWMO STD. W-6 9 EA
  13. THE EXISTING SERVICE TO NEW MAIN PER WWMO STD. W-4 1 EA
  14. CUT/CAP AND ABANDON EXISTING 6" ACP PER WWMO STD. W-29 2 EA
  15. INSTALL 1" BACKFLOW PER WWMO STD. W-20 4 EA
  16. INSTALL 6" RS GATE VALVE PER WWMO STD. W-11 6 EA
  17. INSTALL 8"x6" REDUCER 1 EA

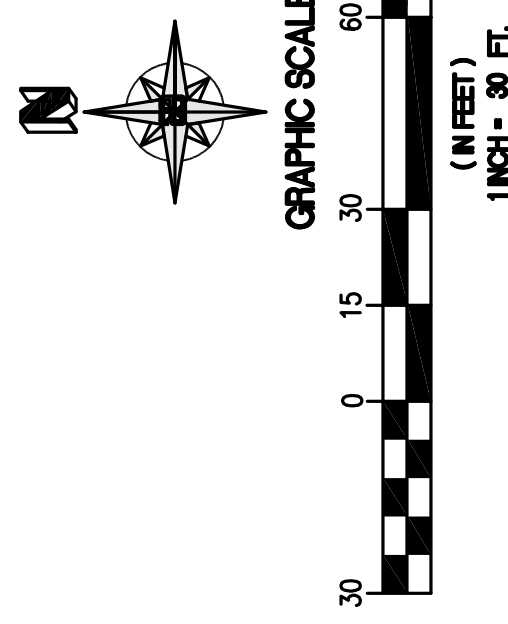
THE QUANTITIES SHOWN HEREON ARE ESTIMATES ONLY. THE CONTRACTORS SHALL PREPARE THEIR OWN QUANTITIES AND BID A COMPLETE JOB.

<p>ALLARD ENGINEERING Civil Engineering - Land Surveying - Land Planning 16866 Seville Avenue Fontana, California 92335 (909) 356-1815 Fax (909) 356-1795</p>		<p>WEST VALLEY WATER DISTRICT WATER IMPROVEMENT PLANS ARROWHEAD MEADOWS TRACT NO. 18827</p>		<p>WIP # D20011</p>
<p>UNDERGROUND SERVICE ALERT CALL: TOLL FREE 1-800-422-4133 TWO WORKING DAYS BEFORE YOU DIG</p>		<p>California Council of Civil Engineers 6 Land Surveyors</p>		<p>SHEET 1 OF 3 SHEETS DWG. NO.</p>
<p>Revision</p>	<p>No.</p>	<p>By</p>	<p>Date</p>	<p>Approval</p>
<p>DESIGNED</p>	<p>CHECKED</p>	<p>DRAWN</p>	<p>DATE</p>	<p>AS SHOWN</p>





- CONSTRUCTION NOTES:**
- 1 INSTALL 8" D.I.P. CLASS 350 PER W/MO SPECS.
  - 2 INSTALL 8" D.I.P. CROSS
  - 3 INSTALL 8" D.I.P. TEE
  - 4 INSTALL 8" RS GATE VALVE PER W/MO STD. W-11
  - 5 INSTALL 1" WATER SERVICE & METER PER W/MO STD. W-4.
  - 6 INSTALL 4" DEAD END FLUSH OUT PER W/MO STD. W-8
  - 7 INSTALL F.H. ASSEMBLY PER W/MO STD. W-2
  - 8 TRENCH/EXCAVATE/BACKFILL PER W/MO STD. W-1
  - 9 HOT TAP WITH MUELLER H-619 8"x8" TAPPING SLEEVE PER W/MO STD. W-19
  - 10 HOT TAP EXISTING 6" ACP WITH MUELLER H-619 6"x6" TAPPING SLEEVE.
  - 11 INSTALL 8" 45° BEND
  - 12 INSTALL 1" AIR VAC PER W/MO STD. W-6
  - 13 THE EXISTING SERVICE TO NEW MAIN PER W/MO STD. W-4
  - 14 CUT/CAP AND ABANDON IN PLACE EXISTING 6" ACP PER W/MO
  - 15 INSTALL 1" BACKFLOW PER W/MO STD. W-20
  - 16 INSTALL 6" RS GATE VALVE PER W/MO STD. W-11
  - 17 INSTALL 8"x6" REDUCER



<p><b>WEST VALLEY WATER DISTRICT</b></p> <p><b>WATER IMPROVEMENT PLANS</b></p> <p><b>ARROWHEAD MEADOWS</b></p> <p><b>TRACT NO. 18827</b></p>		<p>SHEET 2 OF 3 SHEETS DWG. NO.</p>
<p><b>ALLARD ENGINEERING</b></p> <p>Civil Engineering - Land Surveying - Land Planning 18866 Saville Avenue Fontana, California 92335 (909) 356-1815 Fax (909) 356-1795</p>		
	<p>APPROVED _____</p> <p>Date _____</p>	<p>AS SHOWN</p>
<p>UNDERGROUND SERVICE ALERT</p> <p>CALL: TOLL FREE</p> <p>1-800</p> <p>422-4133</p> <p>TWO WORKING DAYS BEFORE YOU DIG</p>	<p>Revision _____</p> <p>No. _____</p> <p>By _____</p> <p>Date _____</p> <p>Approval _____</p> <p>Date _____</p>	<p>Checked _____</p> <p>Job No. _____</p> <p>Drawn _____</p> <p>Scale: _____</p>
<p>CONTRACTOR AGREES THAT IN ACCORDANCE WITH GENERALLY ACCEPTED CONSTRUCTION PRACTICES, CONSTRUCTION CONTRACTOR WILL BE REQUIRED TO ASSUME SOLE RESPONSIBILITY FOR THE CONSTRUCTION OF THE PROJECT, INCLUDING THE SAFETY OF ALL PERSONS AND PROPERTY. THAT THIS REQUIREMENT SHALL BE MADE TO APPLY CONTINUOUSLY AND NOT BE LIMITED TO NORMAL WORKING HOURS, AND CONSTRUCTION CONTRACTOR FURTHER AGREES TO WAIVE TO THE EXTENT PERMITTED BY LAW, ALL LIABILITY, REAL OR ALLEGED, IN CONNECTION WITH THE PERFORMANCE OF WORK ON THIS PROJECT, EXCEPTING LIABILITY ARISING FROM THE SOLE NEGLIGENCE OF DESIGN PROFESSIONAL.</p>		
<p>California Council of Civil Engineers 6 Land Surveyors</p>		





# Exhibit C

**Tract 18827 - Monte Vista Properties**  
**WEST VALLEY WATER DISTRICT**  
**Improvement Bond Calculation**

4-Feb-20

Prepared in the office of  
**ALLARD ENGINEERING**  
 16866 Seville Avenue  
 Fontana, CA. 92335  
**Phone: 909-356-1815**

ITEM	Quantity	Unit	Price	TOTAL
MOBILIZATION	1	LS	\$10,000	\$10,000
HOT -TAP CONNECT TO EXISTING 8" WATER MAIN.	2	EA	\$3,000	\$6,000
HOT -TAP CONNECT TO EXISTING 6" WATER MAIN.	1	EA	\$2,500	\$2,500
CUT AND ABANDON 6" LINE	2	EA	\$500	\$1,000
FURNISH & INSTALL 8" DUCILE IRON PIPE	1830	LF	\$50	\$91,500
FURNISH & INSTALL 4" DEAD END FLUSH OUT	9	EA	\$1,000	\$9,000
FURNISH & INSTALL 8" GATE VALVE	17	EA	\$2,000	\$34,000
FURNISH & INSTALL FIRE HYDRANT ASSEMBLY	5	EA	\$5,000	\$25,000
FURNISH & INSTALL 1" BACKFLOW	4	EA	\$1,000	\$4,000
FURNISH & INSTALL 1" AIRVAC	8	EA	\$1,500	\$12,000
FURNISH & INSTALL 1" WATER SERVICE WITH METER	34	EA	\$1,400	\$47,600
<b>Sub-Total</b>				<b>\$242,600</b>
Contingency (20%)	20%			\$48,520
<b>TOTAL</b>				<b>\$291,120</b>
<b>BOND AMOUNT</b>				<b>\$300,000</b>

# Exhibit D



**ESTABLISHED AS A PUBLIC AGENCY IN 1952**

WEST VALLEY WATER DISTRICT'S MISSION IS TO PROVIDE A RELIABLE,  
SAFE-DRINKING WATER SUPPLY TO MEET OUR CUSTOMERS' PRESENT  
AND FUTURE NEEDS AT A REASONABLE COST AND TO PROMOTE  
WATER-USE EFFICIENCY AND CONSERVATION.

## **2019 HOLIDAY LIST**

TUESDAY, DECEMBER 24	CHRISTMAS EVE
WEDNESDAY, DECEMBER 25	CHRISTMAS
TUESDAY, DECEMBER 31	NEW YEAR'S EVE

## **2020 HOLIDAY LIST**

WEDNESDAY, JANUARY 1	NEW YEAR'S DAY
MONDAY, JANUARY 20	MARTIN LUTHER KING, JR.
MONDAY, FEBRUARY 17	PRESIDENT'S DAY
MONDAY, MAY 25	MEMORIAL DAY
FRIDAY, JULY 3	INDEPENDENCE DAY
MONDAY, SEPTEMBER 7	LABOR DAY
WEDNESDAY, NOVEMBER 11	VETERANS DAY (OBSERVED)
THURSDAY, NOVEMBER 26	THANKSGIVING
FRIDAY, NOVEMBER 27	DAY AFTER THANKSGIVING
THURSDAY, DECEMBER 24	CHRISTMAS EVE
FRIDAY, DECEMBER 25	CHRISTMAS
THURSDAY, DECEMBER 31	NEW YEAR'S EVE

## **2021 HOLIDAY LIST**

FRIDAY, JANUARY 1	NEW YEAR'S DAY
MONDAY, JANUARY 18	MARTIN LUTHER KING, JR.





**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** CONSIDER GRANT OF EASEMENT FROM SC FONTANA DEVELOPMENT COMPANY, LLC FOR TRACT NOS. 17039 AND 17039-1

---

**BACKGROUND:**

SC Fontana Development Company, LLC. (“Developer”) is the owner of land located at the southwest corner of Citrus Avenue and Knox Avenue in the City of Fontana, known as Tract No. 17039 and 17039-1, Shady Trails (“Development”), as shown in **Exhibit A**. In developing this land, the Developer is required to construct new 8-inch water lines within private streets to allow for new domestic, fire and irrigation connections in the tract.

**DISCUSSION:**

In order to operate and maintain the water facilities needed to supply water to the Development, West Valley Water District (“District”) must accept a Grant of Easement. Attached for committee review and approval is a copy of the proposed Grant of Easement labeled **Exhibit B**, showing the full extent of the easements within the project.

**FISCAL IMPACT:**

No fiscal impact to the District.

**STAFF RECOMMENDATION:**

It is recommended that the Engineering, Operations and Planning Committee approve the Grant of Easement from SC Fontana Development Company, LLC. and have this item considered by the full Board of Directors at a future meeting.

Respectfully Submitted,

Clarence C. Mansell Jr.

---

Clarence Mansell Jr, General Manager

DG:ce

**ATTACHMENT(S):**

1. Exhibit A - Aerial Map
2. Exhibit B - Grant of Easement

# EXHIBIT A



# Exhibit A

## Tract 17039 and 17039-1





# EXHIBIT B



**RECORDING REQUESTED BY AND  
WHEN RECORDED RETURN TO:**

WEST VALLEY WATER DISTRICT  
P.O. BOX 920  
RIALTO, CA 92377-0920

ATTENTION: GENERAL MANAGER

THIS DOCUMENT MUST BE SIGNED  
IN THE PRSENCE OF NOTARY &  
NOTARIZED

No Recording Fee required Pursuant to Government Code Section 27383

APN: 1107-262-62

**GRANT OF EASEMENT**

**FOR VALUABLE CONSIDERATION**, receipt of which is hereby acknowledged SC Fontana Development Company, LLC (“**GRANTOR**”) does hereby grant to **WEST VALLEY WATER DISTRICT**, a county water district, its successors and assigns (“**GRANTEE**”) a perpetual non-exclusive easement and right of way to construct, enlarge, reconstruct, remove and replace, operate, inspect, maintain, repair, improve and relocate for pipelines for the transmission of water, connections, devises and appurtenances in, on, over, under, upon, along, through and across the property hereinafter described, together with reasonable right of access to and from said easement for purposes of exercising the rights granted in said easement.

Said easement shall be in, under, over, and across that certain property situated in the County of San Bernardino, State of California, described as follows:

**(SEE EXHIBITS “A” & “B” ATTACHED HERETO AND MADE A PART HEREOF)**

The foregoing easement shall include:

- (a) The temporary use of such adjacent land of Grantor as is necessary to install the facilities provided for under the term of the easement granted herein; and
- (b) The right to enter upon and pass and repass over and along said strip or strips of land, and to deposit tools, implements and other materials thereon by Grantee, its officers, agents and employees, and by persons under contract to construct said pipeline or pipelines, and their employees, whenever necessary for the purpose of exercising the rights herein granted.

Grantor retains the right to the use of the land described herein except as to any use in derogation of the easement contained herein, and specifically agrees that no trees shall be planted thereon and, no buildings or other structures of any kind will be placed, constructed, or maintained over the real property described herein. Any work by Grantor, or any one working through or under Grantor, affecting the surface or subsurface of the ground subject to this easement shall be performed only after giving written notice by certified mail, postage paid, addressed to Grantee as its business office setting forth the proposed changes in detail. Such notice is to be given to the Grantee at least thirty (30) business days prior to commencement of such work and is subject to approval by Grantee. Notwithstanding the foregoing, the surface of the ground with respect to the distance from the ground surface to the top of any pipes, as of the date of this easement, shall not be changed by any party other than Grantee, if it results in:

- (a) “Cutting or removing the soil which leave less than thirty (30) inches of soil over the top of any pipe;

and

(b) "Hauling" in of soil or "filling" which will leave more than ten (10) feet of soil over the top of any pipe.

It is understood that the permanent easements and the rights of way above described shall be acquired subject to the rights of the Grantor, Grantor's successors, heir and assigns, to use the surface of the real property within the boundaries of such easements and rights of way. It is understood that any use of the surface rights by Grantor, and Grantor's successors, heirs and assigns, shall be deemed a continuing permissive use allowed by Grantee, its successors, heirs and assigns, and each successor-in-interest of the Grantor, by acceptance of a conveyance of said property or interest therein admits and agrees that any such use is a continuing permissive use. It is understood that each and every right and privilege hereby granted is free and alienable.

Notwithstanding the foregoing, it is understood and agreed that this Grant of Easement shall not be construed as a Grant of fee title.

Grantee, its successors and assigns, shall restore, or cause to be restored, the surface or subsurface of the real property hereinabove described to the condition said property was in as of the time of performance of any enlargement, construction, reconstruction, removal and replacement, operation, inspection, maintenance, repair, improvement and relocation, and such restoration shall be performed with due diligence and dispatch.

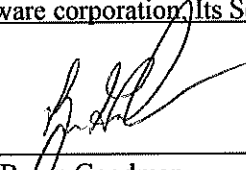
IN WITNESS THEREOF, this instrument has been executed the 30th day of January, 2020.

GRANTOR(S):

SC Fontana Development Company, LLC,  
a Delaware limited liability company

By: Lewis Management Corp.,  
a Delaware corporation, Its Sole Manager

BY: \_\_\_\_\_

  
Bryan Goodman  
Authorized Agent

**ALL CAPACITY ACKNOWLEDGEMENT**

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA  
COUNTY OF San Bernardino

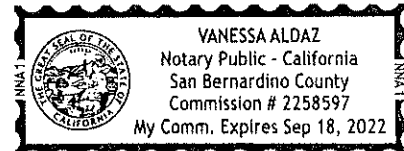
On Jan. 31 2020, before me, Vanessa Aldaz, Notary Public,  
(Name and title of the officer)

personally appeared Bryan Goodman who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity (ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under **PENALTY OF PERJURY** under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Vanessa Aldaz



(SEAL)

**EXHIBIT "A"  
LEGAL DESCRIPTION**

**WATER EASEMENT**

LOTS "A" AND "B", ALONG WITH ALL PRIVATE STREETS, (RALPH LANE, VICENZA LANE, AREZZO WAY, BRINDISI LANE, CASORIA WAY, AND NOVARA AVENUE) NOTED AS PUBLIC UTILITY EASEMENT (DELTA NUMBER 1), ALL WITHIN TRACT MAP No. 17039-1, AS PER MAP FILED IN BOOK \_\_\_\_\_ PAGES \_\_\_\_\_ THROUGH \_\_\_\_\_, INCLUSIVE OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

THE ABOVE DESCRIBED PARCELS ARE SHOWN ON THE MAP ATTACHED HEREWITH AND MADE A PART HEREOF, ENTITLED "EXHIBIT B".

THE ABOVE DESCRIPTION WAS PREPARED UNDER MY DIRECTION.

*Anthony S.C.*

*12/20/19*

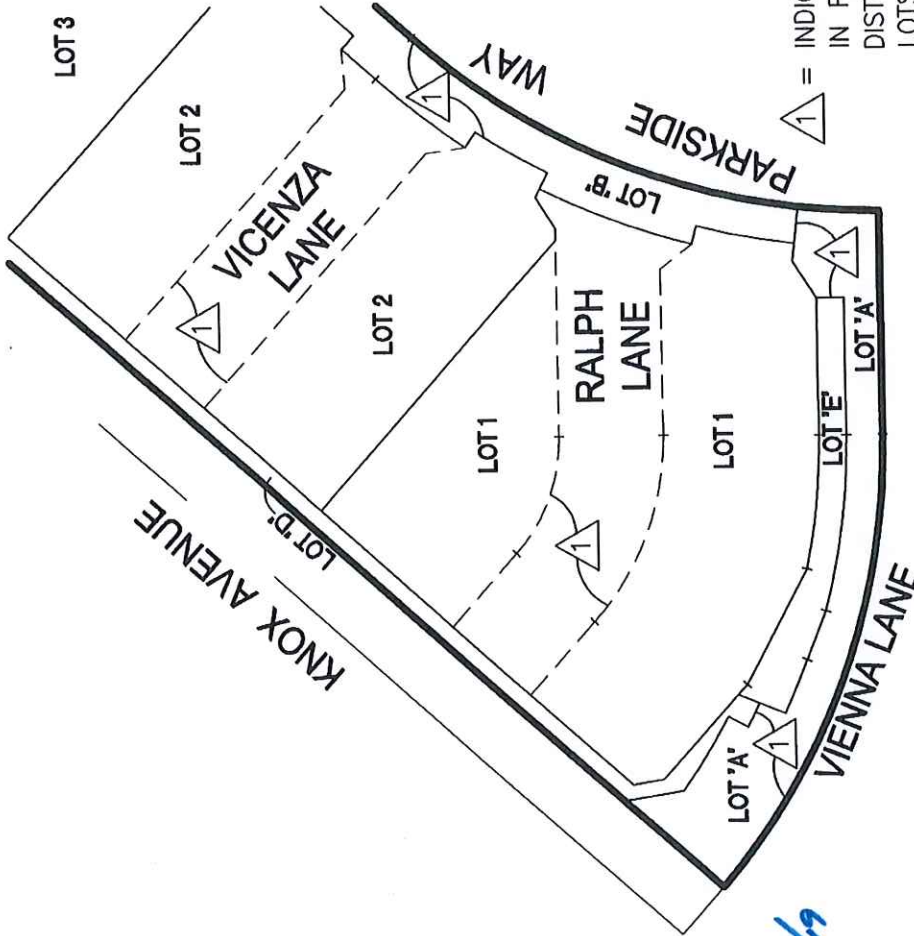
ANTHONY HARO, P.L.S. No. 7635  
EXPIRATION DATE: 12/31/2020  
JN: 126-2018

DATE



**EXHIBIT "B"**  
WATER EASEMENT

SCALE: 1" = 100'



△ = INDICATES A PUBLIC UTILITY EASEMENT IN FAVOR OF THE WEST VALLEY WATER DISTRICT, DEDICATED HEREON. AFFECTS LOTS "A" AND "B" AND ALL PRIVATE STREETS, SHOWN HEREON.

*Anthony Haro*  
12/29/19

ANTHONY HARO P.L.S. 7635  
EXP. 12/31/2020  
J.N.: 126-2018



PREPARED BY:

**MADOLE & ASSOCIATES, INC.**  
Engineering Communities for Life

9302 PITTSBURGH AVE., SUITE 230  
RANCHO CUCAMONGA, CA. 91730  
PHONE: 909.481.6322  
FAX: 909.481.6320

CITY OF FONTANA, CALIFORNIA

SECTION: 24, TOWNSHIP 1 NORTH, RANGE 6 WEST,  
SAN BERNARDINO MERIDIAN.

THIS PLAT IS SOLELY TO BE USED AS AN AID IN LOCATING THE PARCEL(S) DESCRIBED IN THE ATTACHED DOCUMENT. ALL PRIMARY CALLS ARE LOCATED IN THAT WRITTEN DOCUMENT.

TRACT MAP 17039-1	WWD WATER EASEMENT
J.N.:	126-2018
DATE:	12-20-19
DRAWN BY:	AH
SCALE:	1"=100'
SHEET:	1 OF 2

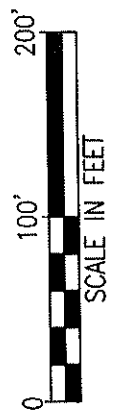
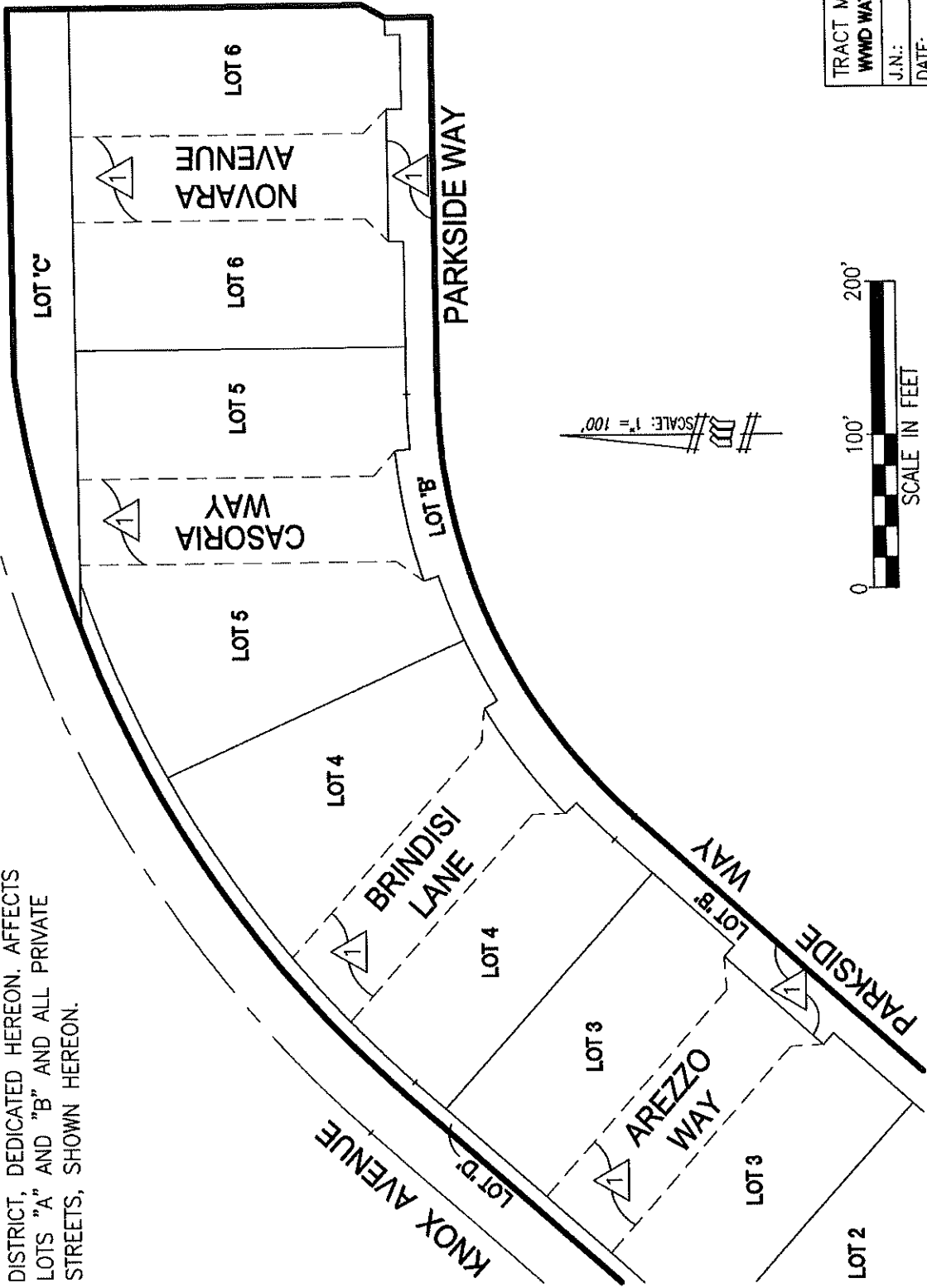


TRACT MAP 17039-1	
WVD WATER EASEMENT	
J.N.:	126-2018
DATE:	12-20-19
DRAWN BY:	AH
SCALE:	1"=100'
SHEET:	2 OF 2

KNOX AVENUE

EXHIBIT "B"  
WATER EASEMENT

△ = INDICATES A PUBLIC UTILITY EASEMENT IN FAVOR OF THE WEST VALLEY WATER DISTRICT, DEDICATED HEREON. AFFECTS LOTS "A" AND "B" AND ALL PRIVATE STREETS, SHOWN HEREON.



SCALE: 1"=100'

**RECORDING REQUESTED BY AND  
WHEN RECORDED RETURN TO:**

WEST VALLEY WATER DISTRICT  
P.O. BOX 920  
RIALTO, CA 92377-0920

ATTENTION: GENERAL MANAGER

THIS DOCUMENT MUST BE SIGNED  
IN THE PRSENCE OF NOTARY &  
NOTARIZED

No Recording Fee required Pursuant to Government Code Section 27383

APN: 1107-262-44

**GRANT OF EASEMENT**

**FOR VALUABLE CONSIDERATION**, receipt of which is hereby acknowledged SC Fontana Development Company, LLC (“**GRANTOR**”) does hereby grant to **WEST VALLEY WATER DISTRICT**, a county water district, its successors and assigns (“**GRANTEE**”) a perpetual non-exclusive easement and right of way to construct, enlarge, reconstruct, remove and replace, operate, inspect, maintain, repair, improve and relocate for pipelines for the transmission of water, connections, devises and appurtenances in, on, over, under, upon, along, through and across the property hereinafter described, together with reasonable right of access to and from said easement for purposes of exercising the rights granted in said easement.

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- (b) The right to enter upon and pass and repass over and along said strip or strips of land, and to deposit tools, implements and other materials thereon by Grantee, its officers, agents and employees, and by persons under contract to construct said pipeline or pipelines, and their employees, whenever necessary for the purpose of exercising the rights herein granted.

Grantor retains the right to the use of the land described herein except as to any use in derogation of the easement contained herein, and specifically agrees that no trees shall be planted thereon and, no buildings or other structures of any kind will be placed, constructed, or maintained over the real property described herein. Any work by Grantor, or any one working through or under Grantor, affecting the surface or subsurface of the ground subject to this easement shall be performed only after giving written notice by certified mail, postage paid, addressed to Grantee as its business office setting forth the proposed changes in detail. Such notice is to be given to the Grantee at least thirty (30) business days prior to commencement of such work and is subject to approval by Grantee. Notwithstanding the foregoing, the surface of the ground with respect to the distance from the ground surface to the top of any pipes, as of the date of this easement, shall not be changed by any party other than Grantee, if it results in:

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and

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Notwithstanding the foregoing, it is understood and agreed that this Grant of Easement shall not be construed as a Grant of fee title.

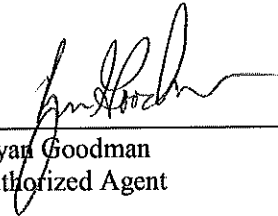
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IN WITNESS THEREOF, this instrument has been executed the 30th day of January 2020.

GRANTOR(S):

SC Fontana Development Company, LLC,  
a Delaware limited liability company

By: Lewis Management Corp.,  
a Delaware corporation, Its Sole Manager

BY:   
Bryan Goodman  
Authorized Agent

### ALL CAPACITY ACKNOWLEDGEMENT

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA  
COUNTY OF San Bernardino

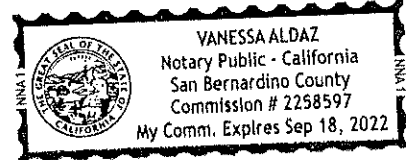
On Jan. 31 2020, before me, Vanessa Aldaz, Notary Public,  
(Name and title of the officer)

personally appeared Bryan Goodman who proved to me on the basis of satisfactory evidence to be the person(s) whose name(s) is/are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity (ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

I certify under **PENALTY OF PERJURY** under the laws of the State of California that the foregoing paragraph is true and correct.

WITNESS my hand and official seal.

Signature Vanessa Aldaz



(SEAL)

**EXHIBIT "A"  
LEGAL DESCRIPTION**

**WATER EASEMENT**

LOTS "A" AND "B", ALONG WITH ALL PRIVATE STREETS, (PRATO LANE, MATERA LANE, VESTA WAY, TERAMO LANE, CESENA WAY, PESARO LANE, AND LOT D) NOTED AS PUBLIC UTILITY EASEMENT (DELTA NUMBER 1), ALL WITHIN TRACT MAP No. 17039, AS PER MAP FILED IN BOOK \_\_\_\_\_ PAGES \_\_\_\_\_ THROUGH \_\_\_\_\_, INCLUSIVE OF MAPS, IN THE OFFICE OF THE COUNTY RECORDER OF SAN BERNARDINO COUNTY, CALIFORNIA.

THE ABOVE DESCRIBED PARCELS ARE SHOWN ON THE MAP ATTACHED HEREWITH AND MADE A PART HEREOF, ENTITLED "EXHIBIT B".

THE ABOVE DESCRIPTION WAS PREPARED UNDER MY DIRECTION.

*Anthony Haro*

*1/28/2020*

ANTHONY HARO, P.L.S. No. 7635  
EXPIRATION DATE: 12/31/2020  
JN: 126-2018

DATE

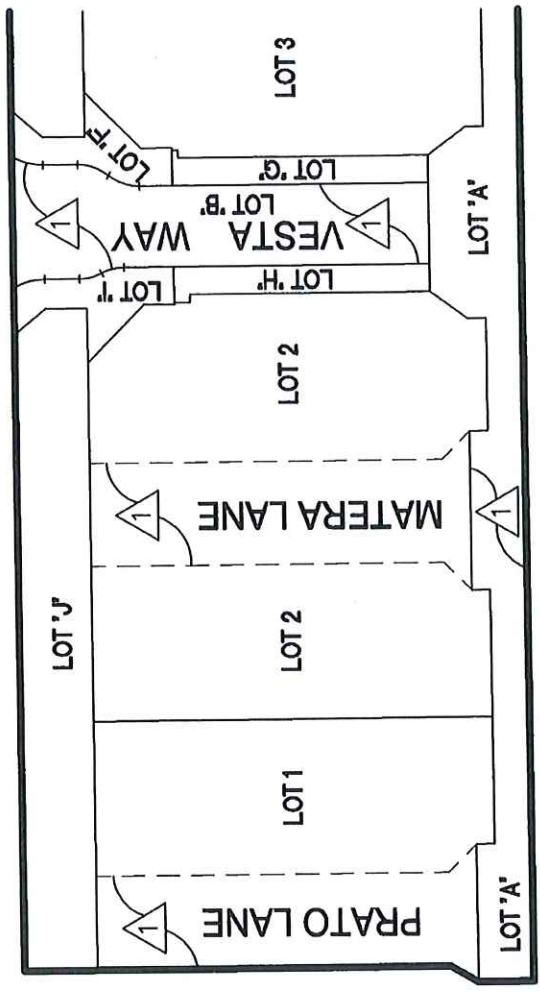
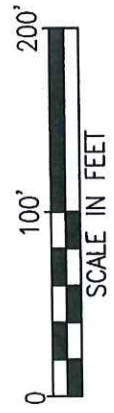




**EXHIBIT "B"**  
**WATER EASEMENT**

△ = INDICATES A PUBLIC UTILITY EASEMENT IN FAVOR OF THE WEST VALLEY WATER DISTRICT, DEDICATED HEREON. AFFECTS LOTS "A" AND "B" AND ALL PRIVATE STREETS, SHOWN HEREON.

KNOX AVENUE



*Anthony Haro*  
ANTHONY HARO P.L.S. 7635  
EXP. 12/31/2020  
J.N.: 126-2018



PREPARED BY:

**MADOLE & ASSOCIATES, INC.**  
*Engineering Communities for Life*

9302 PITTSBURGH AVE., SUITE 230  
RANCHO CUCAMONGA, CA. 91730  
PHONE: 909.481.6322  
FAX: 909.481.6320

CITY OF FONTANA, CALIFORNIA

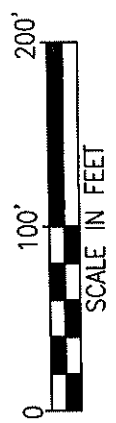
SECTION: 24, TOWNSHIP 1 NORTH, RANGE 6 WEST,  
SAN BERNARDINO MERIDIAN.

THIS PLAT IS SOLELY TO BE USED AS AN AID IN LOCATING THE PARCEL(S) DESCRIBED IN THE ATTACHED DOCUMENT. ALL PRIMARY CALLS ARE LOCATED IN THAT WRITTEN DOCUMENT.

TRACT MAP 17039	WVWD WATER EASEMENT
J.N.:	126-2018
DATE:	01-28-20
DRAWN BY:	AH
SCALE:	1"=100'
SHEET:	1 OF 2

# EXHIBIT "B" WATER EASEMENT

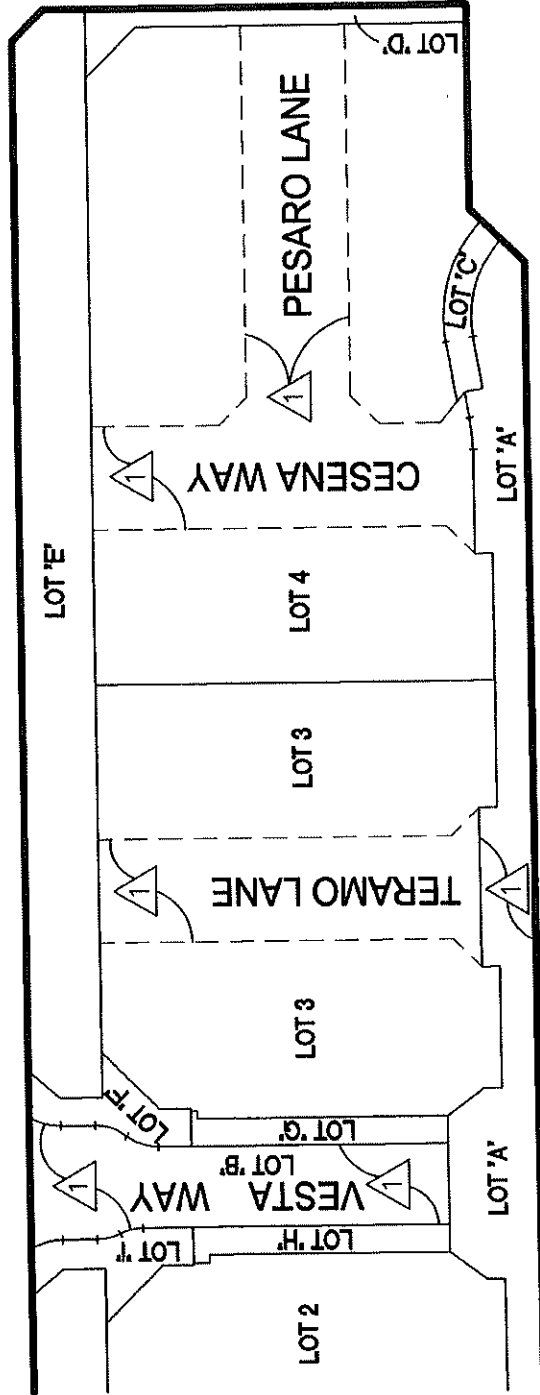
△ = INDICATES A PUBLIC UTILITY EASEMENT IN FAVOR OF THE WEST VALLEY WATER DISTRICT, DEDICATED HEREON. AFFECTS LOTS "A" AND "B" AND ALL PRIVATE STREETS, SHOWN HEREON.



SCALE: 1" = 100'

KNOX AVENUE

CITRUS AVENUE



PARKSIDE WAY

TRACT MAP	17039
WVWD WATER EASEMENT	
J.N.:	126-2018
DATE:	01-28-20
DRAWN BY:	AH
SCALE:	1"=100'
SHEET:	2 OF 2



**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** CONSIDER PURCHASING METER BOX LIDS AS PART OF THE AUTOMATIC METER READING (AMR) PROJECT FROM WESTERN WATER WORKS SUPPLY COMPANY

---

**BACKGROUND:**

West Valley Water District (District) is currently replacing old manually read meters and upgrading older Automatic Meter Reading (AMR) meters to new meters that are capable of operating in either AMR (walk-by/drive-by) or Advanced Metering Infrastructure (AMI) (fixed based) mode as part of the AMR Water Meter Replacement capital project. This gives the District an option to affordably and realistically migrate to AMI in the future. The District currently replaces the existing meter box lids with new custom made lids that accommodate the Meter Transceiver Unit (MXU) radio to be mounted in the lid. The signals are guaranteed to transmit to their proposed range as long as the MXU radios are mounted in the meter box lids. District staff has been ordering five different sizes of meter box lids and has switched suppliers due to competitive pricing and product quality.

**DISCUSSION:**

The new meter box lids come with the District logo and include a piece of metal in them for ease of locating if they are covered with dirt. These features were not offered from a previous supplier. In order for a new supplier to provide the District with one of these products they will have to add this to their production line with substantial cost for new molds and extra production runs.

Nicor, Inc. submitted the lowest quote and is able to supply meter box lids with the requested specifications with a condition that the District would commit to purchasing 2,000 of these specified meter box lids in calendar year 2020. Western Water Works Supply Company is Nicor, Inc.'s exclusive representative. The Meter Services Department has a need for 2,000 specified meter box lids.

The costs are summarized below:

Western Water Works Supply Company	Nicor, Inc.	Oldcastle Infrastructure
\$39.50/Lid + Taxes	\$39.50/Lid + Taxes	\$47.19/Lid + Taxes

The total cost for 2,000 meter lids is \$85,122.50 from Western Water Works Supply company. Orders will be broken up into quantities of 500 each.

**FISCAL IMPACT:**

This item was included in the Fiscal Year 2019/20 Capital Budget and will be funded from project number W20012 titled "Meters and MXU's" with a budget of \$510,000.00.

The District has not put this item out for bid because this is a sole source item.

**STAFF RECOMMENDATION:**

Staff recommends that the Engineering, Operations and Planning Committee approve the purchase of 2,000 B36 Nicor custom polymer meter box lids from Western Water Works Supply Company in the amount not to exceed \$86,000.00 and submit this item for consideration by the full Board of Directors at a future meeting.

Respectfully Submitted,



---

Clarence Mansell Jr, General Manager

CM;jc

**ATTACHMENT(S):**

1. Exhibit A - Photos of Meter Lid
2. Exhibit B - Sole Source Justification Form
3. Exhibit C - Quotes

# EXHIBIT A



Meter Lid - Front



Meter Lid - Back



# EXHIBIT B

# Sole Source Justification

## AMR Meter Lid Replacement

**1. Why do we need to acquire the goods and services?**

West Valley Water District ("District") is currently replacing old manually read meters and upgrading older AMR meters to Advanced Metering Infrastructure (AMI) technology as part of our "AMR – Water Meter Replacement" (W20012) capital project. As we move forward with this project, the District currently replaces the existing meter box lids with new custom made lids that will accommodate our AMI radio (MXU) to be mounted in the lid.

**2. Why are the goods or services the only ones that can meet your needs?**

The Sensus AMI system we use is guaranteed to transmit to their proposed range as long as the MXU/radios are mounted in the meter box lids. We currently order five different sizes of meter box lids and we have switched suppliers due to getting better pricing and product quality. These new lids From Nicor, Inc. come with our District logo and include a piece of metal in them for ease of locating if they are covered with dirt. These items were not offered from our other suppliers.

**3. Were alternative goods/services evaluated? If yes, why are those unacceptable?**

We have one other option from Oldcastle that is made of heavy concrete, which has proven to be too heavy to lift especially repeatedly as is sometimes required by our meter readers. Nicors, Inc. meter box lid is made from lightweight polymer.

**4. What efforts were made to get the best price?**

We requested price quotes from three suppliers. Jensen precast did not reply to our request. Oldcastle came in with the highest price and Nicors, Inc. quote is the lowest.

**5. What impact is there if the sole source is not used?**

The District Will benefit from lower cost, Our District logo will be displayed and we will have a better way to locate our meters if buried.

**Recommendation: We recommend purchasing Nicor, Inc. meter box lids.**

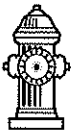
Supervisor/Department Head Signature: Bill W Date: 2/3/20

Supervisor/Department Head Print Name: Bill Krueger

General Manager Signature: \_\_\_\_\_ Date: \_\_\_\_\_

General Manager Print Name: \_\_\_\_\_

# EXHIBIT C



# WESTERN WATER WORKS SUPPLY COMPANY

5671 GATES ST CHINO, CA - 91710  
PHONE: (909)597-7000 | FAX: (909)597-7050

3.f.c

## PROPOSAL

QUOTE DATE	EXPIRATION DATE	QUOTE NO.
11/13/19	12/13/19	552690-00
	JOB ID	PAGE NO.
	NICOR COVER	1

CUST #: 23031

<b>BILL TO</b>
WEST VALLEY WATER DIST P O BOX 920 RIALTO, CA 92377-0920

<b>SHIP TO</b>
WEST VALLEY WATER DIST 855 W BASELINE RD RIALTO, CA 92376

<b>INSTRUCTIONS</b>	<b>SHIP POINT</b>	<b>VIA</b>	<b>SHIPPED</b>	<b>TERMS</b>	<b>CONTACT</b>	<b>BILL KRUEGER</b>
	CHINO	OUR TRUCK		NET 30 DAYS	<b>WORK PHONE</b>	(909) 875-1804
					<b>WORK EMAIL</b>	bill@wvwd.org

LN	PRODUCT AND DESCRIPTION	ORDERED	BO	SHIPPED	UM	PRICE	NET AMOUNT
-	NO DELIVERIES ACCEPTED BETWEEN 11:30-1:00 (CLOSED FOR LUNCH)						
1	B13NLCUSWVWTHSS# B36 NICOR READ-RITE POLYMER COVER CUSTOM CREATIVE GRAY WEST VALLEY WATER LOGO SENSUS SHALLOW RECESS WVW#4	500		500	EA	39.50	19750.00
1	Lines Total	Qty Shipped Total	500		Total		19750.00
					Taxes		1530.63
					Invoice Total		21280.63



*Smooth Running Jobs*





# Quote

Bill Kruegar

West Valley Water  
855 Rialto, CA92377  
909-820-3709

[bill@wwwd.org](mailto:bill@wwwd.org)

Date	November 7, 2019
Valid Until	December 31, 2020
Quote #	AC112019-4
Customer	West Valley Water
Project	

Product Number	Description	Quantity	Cost	Line Total
B13NLCUSWWthSS	Nicor Read-Rite Polymer Replacement Lid for B36, No Lock, Custom Creative Gray, West Valley Water Logo, Gray, Sensus Shallow Recess WWV#4  Initial po's need to total 2,000 lids and full quantity must ship in 2020. Orders may be broken up into quantities of 500.	500	\$ 39.50	\$ 19,750.00

### Special Notes and Instructions

Freight Included

Total \$ 19,750.00

**Thank you for your business!**

Should you have any questions concerning this quote, please contact Amy Collins 512-971-8679  
Tel: 512-971-8679 Fax: 512-276-2033 E-mail: [amyecollins@nicorinc.net](mailto:amyecollins@nicorinc.net) Web: [www.nicorinc.net](http://www.nicorinc.net)



Oldcastle Infrastructure  
509 S McKenna St  
Poteau OK 74953  
United States

Phone: (918) 564-2250  
Fax: (866) 446-6519  
www.oldcastleinfrastructure.com

# Contract & Proposal

## EST13753

Date: 11/13/2019

**Bill To**

West Valley Water District  
855 W BASE LINE RD  
RIALTO CA 92376-3103  
United States

**Ship To**

Stock  
West Valley Water District  
855 W BASE LINE RD  
RIALTO CA 92376-3103  
United States

Contact Name:

Contact Phone:

All products and services listed on this Estimate are provided under the Standard Terms and Conditions located at [www.oldcastleprecast.com/company/Pages/TermsandConditions.aspx](http://www.oldcastleprecast.com/company/Pages/TermsandConditions.aspx). Items and quantities shown are the basis for the quotation, and we are not responsible for any discrepancies between this list and actual items or quantities.

Expires	Customer	Terms	Sales Rep	Partner	Delivery Terms
12/13/2019	121078	Net30	Sitarz, Brian	300118 OES - House account	

Quantity	Unit	Item	Tax	Unit Price (Rate)	Ext. Amount
1	Ea	02007101 Lid, FL03 P 'WATER', AMR 2.0" X 4.125" X .3125"	Yes	\$17.16	\$17.16
1	Ea	02500045 Lid, FLX09 P - "Water", AMR 2.0" x 4.125" x .3125", Flexnet	Yes	\$30.18	\$30.18
1	Ea	02001032 Box, FL12 T 12" (W/Mouseholes) FL12TBOX12 WM	Yes	\$48.37	\$48.37
1	Ea	02001385 Lid, FL12 P - "Water", AMR 2.0" X 4.125" X .125"	Yes	\$29.63	\$29.63
1	Ea	02006095 Box, FL36 T 12" FL36TBOX12	Yes	\$78.27	\$78.27
1	Ea	02001568 Lid, FL36 P - "Water", AMR 2.0" X 4.125" X .125"	Yes	\$75.00	\$75.00
1	Ea	12204092 Lid, LPC 1220, "Water", AMR AMR - 2.125" x 4.125" x .1875"	Yes	\$47.19	\$47.19

**Subtotal** \$325.80

**Tax (7.75%)** \$25.26

**Total (USD)** \$351.06

Sales Person: Sitarz, Brian

(Accepted by)



EST13753

1 of 2

Packet Pg. 255





**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** CONSIDER AN AGREEMENT WITH ERS INDUSTRIAL SERVICES, INC. FOR FBR FILTER UNDERDRAIN REPAIR PROJECT

---

**BACKGROUND:**

An agreement between the West Valley Water District (District) and the Goodrich/United Technologies Corporation (UTC) was executed on January 1, 2014, for Rockets, Fireworks and Flares Superfund Site Remediation. Subject to the terms of this agreement, UTC pays the District for operation and maintenance costs of the Fluidized Bed Biological Reactors Water Treatment (FBR) Plant.

The FBR Plant has two Trident filters. Beneath each filter is an underdrain system that collects filtered water during the filter run, and distributes air and water during the backwash cycle. A sink hole in the filter media and various media migration issues were reported, which indicated the underdrain system might be compromised. On November 21, 2019, the Board of Directors awarded a contract to ERS Industrial Services, Inc. for FBR Filter Underdrain Inspection and Media Handling. The inspection is now complete and there is a need to address identified deficiencies and reconstruct the underdrain system for both FBR Trident filters.

**DISCUSSION:**

On January 21, 2020 both WesTech, the manufacturer of Trident Filters, and ERS performed inspection of the filter underdrains and coatings of both FBR Trident filters. The filter underdrains have totally failed due to media entering the underdrain and working its way to the underside of the media retention plate. Baffle wall deflection, missing screws, gasket material, and biofouling of the laser cut slots are all contributing factors. It is recommended that the current "MULTIBLOCK" plastic underdrains with stainless steel media retention plate be converted to a conventional stainless steel manifold and laterals system with gravel pack to match the filter underdrains at the Oliver P. Roemer Water Filtration Facility.

The scope of work consists of demolishing and removing underdrains down to concrete fill, installing a conventional stainless steel manifold and laterals system, installing air scour system to work above filter gravel pack, recoating the lower 30 inches of filter interior and topping off filter media for both filters. Baffle wall will be repaired on a separate quote after underdrains have been removed. Clarifier nozzles and piping will be repaired on a separate quote.

District staff kept UTC informed of the cost to provide the specified services. UTC would like the District to have the FBR Underdrain Repair project completed timely and have the FBR Groundwater Treatment Plant back in service treating perchlorate associated with the perchlorate plume as soon as possible. District staff is treating this as an emergency project. Below is a cost summary:

ERS Industrial Services, Inc.
\$716,330.00

The goal is to have the underdrains repaired in cooler months when the water demand is at its lowest. The project is anticipated to be completed within 8 weeks. Once the project is complete, reinoculation of microbiological seeds for the biological reactors would take an additional month before the FBR Groundwater Treatment Plant can be placed back in service.

**FISCAL IMPACT:**

This is a reimbursable cost. Funds are available in the District UTC current account to back stop this until the project is complete.

The District has not put this item out for bid because this is an emergency project.

**STAFF RECOMMENDATION:**

Staff recommends that the Engineering, Operations and Planning Committee approve an Agreement with ERS Industrial Services, Inc. for FBR Filter Underdrain Repair Project and submit this item for consideration by the full Board of Directors at a future meeting.

Respectfully Submitted,




---

Clarence Mansell Jr, General Manager

CM:jc

**ATTACHMENT(S):**

1. Exhibit A - ERS & WestTech Inspection Reports
2. Exhibit B - ERS Proposal



# EXHIBIT A



January 30, 2020

West Valley Water District  
855 W. Base Line Road  
Rialto, CA 92376

**Attention: Ernie Montelongo**

**Reference: Underdrain Inspection**

Dear Ernie Montelongo

On January 21, 2020 ERS performed an inspection of the filter underdrains and coatings of Filters 1 & 2 at the Water Filtration Plant located at 855 W. Baseline Rd in Rialto CA. The purpose of the inspection was to identify the cause of poor filter performance. Previous inspections noted boiling during backwashes a depression in the media when the filter was drained and black sealant in the media indicating filter underdrain issues. It was also observed in previous inspections that the coatings were showing signs of failure and wear. The approach to the inspection was to observe the underdrains with all media removed from the filters to allow proper inspection of the condition of the underdrains and coating system. The following are the deficiencies noted during the inspection.



### **Filter 1 & 2 inspection notes**

- The filter underdrains are Siemens “MULTIBLOCK” plastic underdrains with Stainless Steel media retention plate, Internal Air scour and are grouted in place.
- Grout between blocks and chamfers solid and in good condition
- Major deflection of baffle wall at end of lateral (see pics)
- Majority of stainless-steel retention plates are with missing or dislodged screws, allowing sealant to protrude from sides and ends (see pics)
- A few media retention plates were removed, and filter media was observed on top of the plastic block. The media plates were also bent up at the ends allowing the sealant to move out of place. (see pics)
- Some fouling of laser cuts in media retention plates
- Using a probe, filter media was noted in the side chambers of the “MULTIBLOCK”
- Coatings are rough with areas of delamination from improper prep between coats. The roughness of the coating appears to be from moisture or insufficient sweat in time of the coatings during installation.

### **Summary**

The filter underdrains have totally failed due to media entering the block and working its way to the underside of the of the media retention plate. It is difficult to tell what is causing the underdrain failures. Baffle wall deflection, missing screws, gasket material and fouling of the laser cut slots are all contributing to the poor filter performance. Due to the design of the underdrain system and the movement of the baffle wall there is no effective way to flush and repair the underdrain system. A complete demolition and re-design are recommended.

### **Recommendations**

Re-design filters and underdrains to perform like the other filters in the districts system

This is a brief description of work to modify these filters to operate like the other filters in the district system.

- Demo and remove underdrains down to concrete fill
- Design and install a conventional Stainless-Steel manifold and laterals system with gravel pack to match the filters at the district other treatment facility
- Re-Design Air Scour to sit at gravel fine media interface.
- Prep and Re-Coat filters and Clarifier with epoxy

Sincerely

Nik Radonich

**Trip Report**

Sales, Shows, Pre-Engineering and other Non-Field Service Trips

Basic Info				
By: Greg PAYNE		Report Date: 1/30/2020		Trip Date: 1/21/2020
Estimator/PM/PC:			Group # Group 64 - Microfloc/General Filter Engineering	
Email Distribution to:				
Related Oppty:				Job # 21785
Agency: MISCOWater Southwest			Salesperson: Steve Wallace	
Related Account/Plant Name: West Valley Water District			Address: 855 West Baseline Road Rialto, CA 92376 USA	
Reason for Trip / Summary: Inspect Multiblock Underdrains				
Plant Information				
Avg. Flow:		Application:		Budget Cycle:
Peak Flow:		Process:		Equipment:
Contacts				
Title	Name	Company	Phone #	Email
T-5 Senior Water Treatment Plant Operator	Ernie Montelongo	WVWD	(909) 543-8549	emontelongo@wvwd.org
Contractor	Nik Radonich	ERS Industrial	(510) 552-3285	nik@ersfilter.com
Trip Details				
Punch List Items				
Follow Up Trip Required? No		If yes, Why:		
Daily Trip Notes				
<p>Steve Wallace and I visited the two (2) Trident units at WVWD that treat the effluent from the Perchlorate removal Envirogen units. The plant has observed silicone strips on the media and in the wash troughs, elevated differential pressure after a filter backwash (backwash at 8ft differential and it only drops to 5-6 ft after backwash), cracking and sink holes in the media, and media in the clear well. The plant hired ERS to remove the media in the two (2) Trident tanks for inspection of the underdrains.</p> <p>It appears that the direct media retention laser shields have been compromised. The laser shields have deflected from the plastic blocks and allowed media to get inside the blocks. The silicone strips between the blocks and laser shield have blown out. The tank walls have deflected to allow some media to fill a gap between the lateral end caps and the tank wall. There is a gap between the filter tank wall and the AC tank wall. The plant has inspected the weep hole between the 2 tanks walls and did not observe any water in that gap.</p> <p>The grout between the blocks appears to be in good shape. The blocks do have some media inside them</p>				

## Trip Report

Sales, Shows, Pre-Engineering and other Non-Field Service Trips

- verified by a wire going through the blocks after the shield was removed. This media is in the secondary lateral of the block.

The plant had observed some splashing in the AC section of the Trident and wanted to inspect the air lines for cracks or plugging.

Based on these observations and past experiences, WesTech offers 2 different options to get these units back in operation.

#### Option 1 - Reuse Existing Blocks

1. Remove all laser shields and silicone strips from the blocks. Clean surface of blocks to remove any media, silicone residual, etc.
2. Remove grout from the ends of the laterals at the interface of the tank wall (the grout fillets that separated from the tank wall). Clean all removed grout
3. Re-grout this fillet to close the gap between the laterals and the tank wall. Clean up excess grout.
4. Fill the filter tank with water and allow water to flush through the blocks and out of the filter to waste line. If access is possible, try to quantify the amount of material/media leaving the filter. Attempt this drain/flush 3 times and determine if the media exiting the filter to waste becomes less and less.
5. Use the wire to determine the amount of media still inside the secondary laterals of the blocks. WesTech recommends reusing these blocks if the media inside the blocks is 1" or less.
6. A gravel layer (reverse graded gravel) will be added on top of the blocks to replace the function of the laser shields - media retention. Add existing filter media on top of gravel layer OR add new filter media. We are still evaluating the sample of media and will make a recommendation next week.
7. Air can still be sent through the existing blocks and through the gravel layer to scour the media during a backwash. The backwash sequence MUST be modified to remove the simultaneous air/low rate water step in the freeboard fill phase.
8. Remove AC media and inspect the air header for cracks or plugging. Inspect water distribution piping for cracking or excess AC media. Inspect tank walls and welds.
9. Re-coat tanks as desired by the plant
10. Please send WesTech an AC media sample for inspection, but most likely the AC media will be reused.

#### Option 2 - Remove Blocks and install header and lateral design

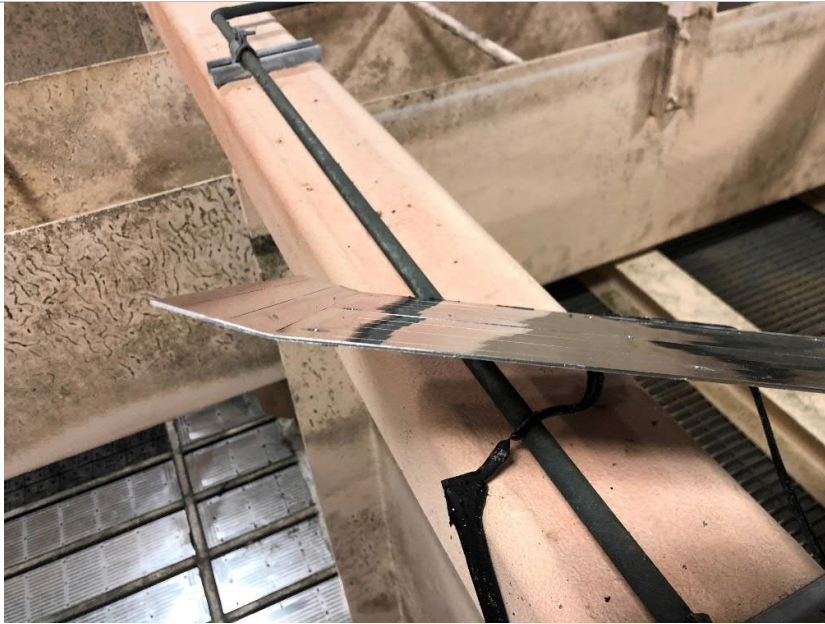
1. Remove all blocks and concrete from tank.
2. Add new header and lateral system with concrete, gravel, and media.
3. Re-coat tanks as desired by plant



Trip Report

Sales, Shows, Pre-Engineering and other Non-Field Service Trips

---



Laser shield buckled at ends and silicone strips blown out



Grout between blocks appears to be in good condition

## Trip Report

Sales, Shows, Pre-Engineering and other Non-Field Service Trips

---



Gap between end of underdrain laterals and tank wall near AC section of Trident



Underdrain block with laser shield taken off. These holes allow some inspection of media in the blocks by inserting a wire through the holes into the secondary lateral of the blocks.

Trip Report

Sales, Shows, Pre-Engineering and other Non-Field Service Trips

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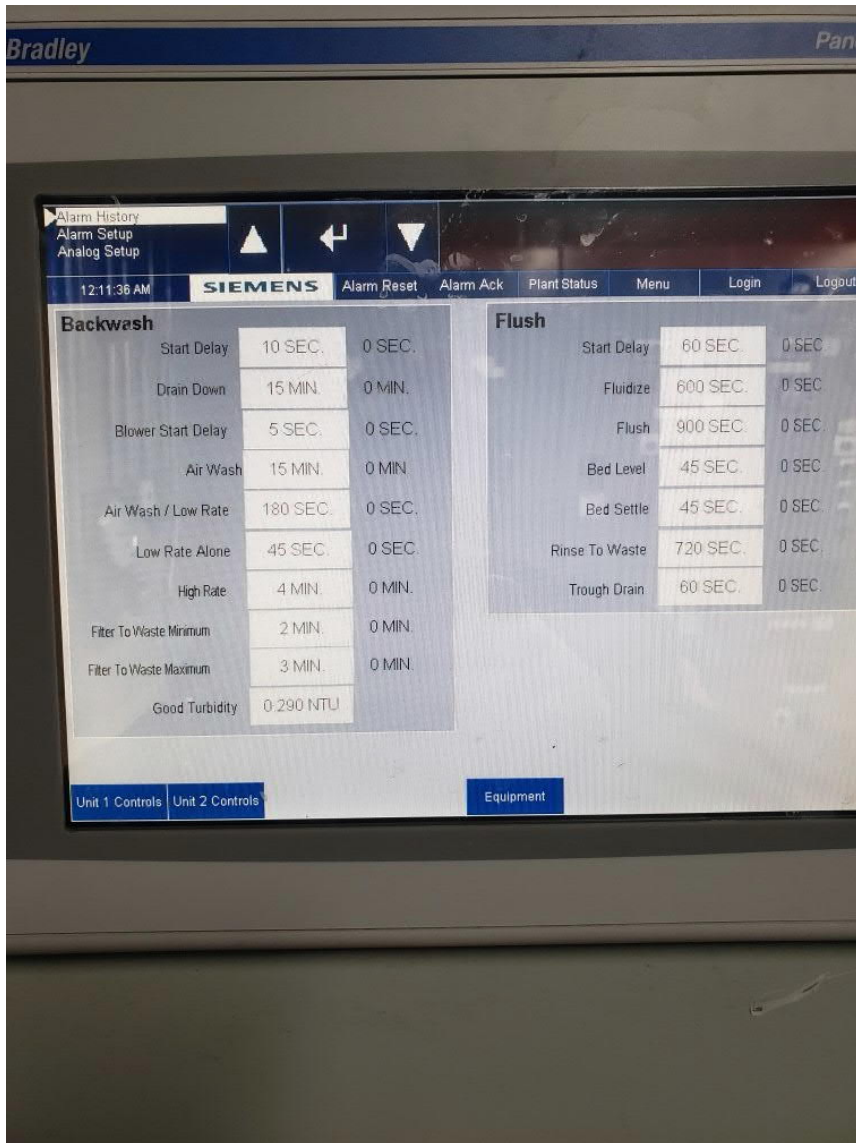


Example of the need for re-coating of tank interior. Near center flume of filter.



Trip Report

Sales, Shows, Pre-Engineering and other Non-Field Service Trips



Backwash sequence. The 180 sec Air wash/Low rate phase will need to be eliminated if blocks are reused with gravel layer. The high rate 4 Min phase may need to be adjusted based on developing a wash out curve (sample backwash water every minute and test for turbidity) If turbidity is still elevated after 4 Min, this high rate water may need to be extended. We normally see a 7 Min high rate water step.

# EXHIBIT B



February 5, 2020

Ernie Montelongo  
West Valley Water District  
PO Box 920  
Rialto, CA 92337

**QUOTE #:** WVW013120R1-1QIC

**PHONE #:** 909-874-1323

**EMAIL ADDRESS:** emontelongo@wvwd.org

Dear Ernie Montelongo:

ERS is pleased to submit its Turnkey proposal Change order to Contract 20-0459 to Re-Design and Rehabilitate (2) Microfloc Filter underdrains including prep and coatings of the Lower 30" of the filter basins only, after demolition of existing plastic block system at the water treatment plant located in Rialto, CA.

Quote is based on working on (2) filters at the same time.

#### **Scope of Supply**

- Removal, packaging, and storage of clarifier media for reuse
- Complete demolition of existing filter underdrain system
- Design, Fabricate and supply new underdrain system using a standard 316 Stainless-Steel Lateral underdrain system and gravel pack.
- Design, Fabricate and install Air Scour system to work above filter gravel pack.
- Coatings – Filter Interior Lower 30" only.
  - Full containment, environmental control, and protection of underdrains throughout the coatings process
  - Surface preparation of steel substrate in accordance with SSPC-SP 10/NACE 2: Near-White Metal Blast Cleaning @ 3-5 mil profile lower 24" Scuff sand 6" of original coatings for tie in
  - Plural spray application (one coat) of 100% Solids SherPlate PW Epoxy (White) @ 40-50 mil DFT 30" from floor
  - Holiday detection and inspection in accordance with SSPC-PA 2
- Coatings – Filter Exterior:
  - None
- Installation of new filter media per design (Media loading is part of original contract and not part of this scope) and reinstallation of existing clarifier media with new gaskets for screens

Baffle wall will be repaired on a separate quote after underdrains have been removed  
Clarifier nozzles and piping will be repaired on a separate quote.

*ERS will require a media sample for Disposal Testing prior to scheduling the project\*.  
ERS will also repair or replace existing underdrains as needed, on a time and materials basis\*\*.*





INDUSTRIAL SERVICES, INC.

*\*Disposal testing and transport to be executed in compliance with RCRA Subtitles C & D*

*\*\*Price does not include bonding*

### **Standard Provisions**

1. Qualified manpower:
  - a. Onsite Supervisor/Environmental Technician/Hole Watch
  - b. Certifications in Forklift/Reach Lift, Crane Operator, Confined Space & Rescue, and First Aid/CPR/AED
2. Equipment and PPE:
  - a. High-power industrial vacuum system
  - b. Ventilation fan for air circulation
  - c. Four gas monitors for pre-entry and continuous LEL testing
  - d. Air-purifying respirators (supplied air respirators available if required)
3. Safety Regulations:
  - a. Confined Space:
    - I. Tripod/winch for emergency evacuation
    - II. Fall arrest harnesses with safety lanyards for all men
    - III. Permit-required confined space entry permits as applicable
    - IV. Daily monitoring log
  - b. 2-Way radios for communication with in-tank personnel
  - c. Cellular phone as an emergency response tool
4. New media as follows:
  - a. Filter Gravel
  - b. Filter Garnet
  - c. Filter Sand
  - d. Filter Anthracite

### **Additional Coatings Provisions**

1. Quality Control:
  - a. NACE Coating Inspector – Certified to be onsite for duration of coatings phase in order to:
    - I. Perform and document hold-point inspections in accordance with specifications
    - II. Provide final inspection and approval of coatings application
    - III. Produce Daily Inspection Reports confirming coatings operations are in conformance with applicable standards
2. Equipment and PPE:
  - a. Environmentally controlled trailer with heated plural component spray equipment and specialized equipment technician
  - b. 24 hour continuous environmental control with dehumidification and monitoring of blasting and coating area



**PRICING: \$716,330.00**

**Quote Valid for 45 days**

**Our time and materials work is billed at \$195.00 per man-hour, straight time, plus materials with a 25% margin. Price includes all applicable sales tax.**

Please feel free to call me should you need further information or any clarification. My cell phone is (510) 552-3285; office is (510) 770-0202.

Sincerely,

Nik Radonich  
Sales-Engineer

Dear Customer,

Upon acceptance of this Quotation, please complete the attached Project Information Sheet and return a signed copy of the entire Quotation Package via fax or e-mail to:

F: (510) 770-3024

E: [kbyers@ersfilter.com](mailto:kbyers@ersfilter.com)

**ERS Industrial Services, Inc.**  
**General Engineering Contractor – Class A**  
**Painting and Decorating Contractor – Class C33**  
**CSLB License #724233**  
**Registered DIR Public Works Contractor**  
**PCWR #1000003275**

**WE THANK YOU FOR YOUR BUSINESS!**



**BOARD OF DIRECTORS  
ENGINEERING AND PLANNING COMMITTEE  
STAFF REPORT**

**DATE:** February 12, 2020  
**TO:** Engineering and Planning Committee  
**FROM:** Clarence Mansell Jr., General Manager  
**SUBJECT:** CONSIDER REPAIRING RESERVOIR 3-A-1 JOINTS FROM RSH CONSTRUCTION SERVICES

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**BACKGROUND:**

Reservoir 3-A-1 located at 855 West Base Line Road in Rialto has been in operations since 1972. The 46-year roof was replaced in 2019. Prior to placing the 2-million-gallon concrete reservoir back in service, new caulking would need to be applied to all joints and reservoir would need to be cleaned and disinfected. The caulking should be replaced every 20 years. It appears that the caulking has never been replaced in this reservoir. If the reservoir joints are not caulked, the anticipated leakage rate is approximately 30 gallons a minute from leaky joints.

**DISCUSSION:**

RSH Construction Services inspected the reservoir on January 15, 2020 and submitted a quote for the joint repairs. Attached as **Exhibit A** is the Inspection Report. The scope of work consists of pressure washing the interior of the tank to clean off any existing debris, removing approximately 2,200 linear feet of existing joint filler from the interior of the tank, applying 2,200 linear feet of new filler approximately 50 mils or 0.05 inch in thickness of CIM 1060 to all joints, and cleaning and disinfecting the reservoir. CIM 1060 is a liquid applied urethane coating that is ANSI/NSF 61 approved for potable water, excellent wear and abrasion resistance, cures in hours to form a tough elastomeric coating, and ideal for caulking concrete reservoirs.

In addition to RSH's quote, District staff solicited additional quotes. Kitson Contracting Inc. submitted a quote for joint repairs but not final cleaning and disinfecting the reservoir. DN Tanks declined the project due to lack of capacity to take on the project. The quotes are summarized below:

Scope of Work	RSH Construction Services	Kitson Contracting Inc.	DN Tanks
Removal and reinstallation of joint filler	<b>Yes</b>	Yes	No
Clean and disinfect the interior of the tank	<b>Yes</b>	No	No
Total Price	<b>\$37,000</b>	\$98,800	Declined

**FISCAL IMPACT:**

Projects of this type were anticipated in the Fiscal Year 2019/20 Capital Budget and will be funded from project number W20015 titled “Annual R/R – Well and Pumping Equipment” with a budget of \$100,000.

The District has complied with the District’s purchasing policy regarding this item.

**STAFF RECOMMENDATION:**

Staff recommends that the Engineering, Operations and Planning Committee approve the Reservoir 3-A-1 Joint Repair project in the amount of \$37,000 and have the General Manager issue a purchase order to RSH Construction Services and submit this item for consideration by the full Board of Directors at a future meeting.

Respectfully Submitted,



---

Clarence Mansell Jr, General Manager

CM:jc

**ATTACHMENT(S):**

1. Exhibit A - Inspection Report
2. Exhibit B - Quotes

# EXHIBIT A



# INSPECTION REPORT

## 2.0 Million Gallon Reinforced Concrete Tank

### Rialto, CA

On January 15, 2020 a cursory inspection was conducted on a 2.0-million-gallon concrete water storage reservoir located in Rialto, CA. The inspection was performed by Mr. Mark Moore of RSH Construction, also present from the West Valley Water District was Mr. Joe Schaack. The tank measures 146' 9" x 125' on the exterior.

The purpose of the inspection was based on concerns expressed from the Owner regarding the structural integrity of the referenced reservoir. Potential structural issues with the roof was raised during a previous exterior inspection. The Owner wanted to determine if the tank would require rehabilitation in order to provide the City another 10 years of service life. The tank is located at West Valley Water Districts corporate yard located at 855 W Base Line Rd in Rialto, CA.

According to plans provided by the Client, the tanks engineer of record was Neste, Brudin & Stone located at the time in San Bernardino, CA. The firm eventually moved to San Diego and became NBS/Lowry until their closing in 2000. According to information provided, the tank was designed in 1972. It is assumed that the tank construction was completed in 1973 making the tank 47 years old.

#### **Reservoir Overview**

The structure sits within the owners gated yard and is partially buried approximately 11' by the drawings. The tank is a reinforced concrete structure, with a rectangular footprint incorporating 11'-8" vertical walls. The wall sits on a "wall footing" which is 1' thick, and 2-9" wide. According to the Owners Drawings, the wall footing to vertical wall connection is a fixed, keyed connection and incorporates a 4" water-stop. This type of water stop used had virtually no ability to stop leaks at the joint due to the technology used during this period as they were smooth plastic or metal and they were placed in vibrated concrete with would allow water to pass between the non-binding

surfaces once the caulking wore off. Today's water-stop technology would utilize a 6" minimum with several ridges on both sides to create a labyrinth for the water to go through before allowing water to reach the subgrade under hydrostatic load, regardless if the caulking failed. The caulking should be replaced every 20 years, it appears that the caulking has never been replaced in this tank.

The tank floor has a flat area as well as a horizontal area (Hopper Bottom). The slope floor is 10'-9" on a 2 to 1 slope below the vertical parapet wall. The total depth of the reservoir would be just shy of 18' deep'.

According to the drawings supplied by the owner, the roof was designed as a T-beam sectional roof system supported by 6 concrete columns down the center of the long axis of the tank. Two of the shorter columns are built into the North and South wall and sit above the sloped wall, the other four 18' square columns have footings below the 6" concrete slab on a 10' square slab 18" thick.

There are 18 double T-beam extending from the East /West walls to the column supported beam down the middle for a total of 36 beams approximately 63' in length each. The Pre-stressed T-beams are supported in place by a concrete girder that runs down the center of the tank in the North/South direction supported by the columns.

According to the owner, the tank is rarely taken out of service and the tank has been in operation virtually maintenance free since the tank was constructed and put into service. The tank has a ladder with no cage, as well as 24" x 26" access hatch. There is also a 3' x 3' service hatch. According to the Owner the cracks on the East and North walls show moisture when the tank is full.

### **Exterior Wall**

The exterior wall above grade was inspected. The south wall has a tremendous amounts of plastic shrinkage cracks. Though unsightly, these cracks pose no structural issues. They were most likely created when the concrete was poured in either high heat or humidity causing the concrete to excessively bleed excessive moisture before any proper curing could take place. The North and East walls both have cracks that can be seen through the paint and are active leaks.

### **Exterior Roof**

The roof is now covered by a coated roofing system. The prestressed concrete T-beams have been bonded together in a manner that this inspector could not see. The roof had been the reason for the tank being taken out of service as the corrosion on the connections between the beams was excessive and exterior weather was able to penetrate between the T-beams causing water quality issues inside the tank. The tank was originally utilizing a roof tar paper system that had completely failed.

### **Interior Roof**

The interior roof was visually inspected from the floor elevation. From my observations the roof appeared to be structurally sound. There are many areas where the caulking rope that separated each T-beam could be seen hanging down from the roof. Many pieces of the lightweight concrete could be found broken on the floor.

### **Columns**

The columns appeared to be in good condition. The girder supporting the roof also looked in good condition. The floor joints could be a source of leakage.

### **Interior Wall**

The interior walls appear to be in fair condition with heavy cracking vertically every 5-8 feet. Some of these cracks have homogeneously sealed themselves by the free lime in the cement passing thru the crack and sealing the void. The cracks on the parapet wall on the East and North sides should be sealed to stop the moisture passing thru the wall, likely corroding the rebar inside the wall. It appears that all these areas have been previously patched either after construction to repair the defects, or a diver cleaning the tank patched them. Either way, the patches have all failed.

### **Sloped Wall/Floor**

The sloped wall sections did not show any typical cracks that we normally see with sloped floors. The area was sounded using a steel chain to determine if there were any hollow areas under the 6" sloped floor. None were detected. The caulking needs to be replaced between the vertical wall and the top of the sloped wall as well as the vertical joints on each side of the section. There are concrete

stairs near the ladder that are in good condition. The concrete has lost the finish layer (top 1/16<sup>th</sup> of an inch) and the concrete shows the aggregate. If this tank was expected to be in service more than 10 years, I would recommend the entire sloped wall and floor receive a coating. There is a discoloration on the floor that might just be dirt.

### **Horizontal Floor**

The area was sounded using a steel chain to determine if there were any hollow areas under the 6" flat floor. None were detected. The caulking needs to be replaced between the floor sections. There is standing water in many sections of the floor, but it did not impede the inspection. There is a major crack below the drainpipe that has a large separation. This is typically found when there are sump areas inside a concrete tank. This leak would go undetected as the subbase will absorb as much as the leak will allow. I have seen cracks this size produces a high amount of water released each day if left unchecked. The caulking needs to be replaced between the floor panels. There is a hole on the West side that looks like a drill bit was used. This spot must be patched. There are spots on the Norther section that looks like someone had placed a patch of an elastomeric.

### **Appurtenances**

The interior ladder is in good condition but does not incorporated the use of a safety climb system. The first rung below the hatch is difficult to maneuver and a ladder that extends from the wall should be designed to not allow an accident that would allow an 8' fall to the concrete landing below.

The tank is vented by four windows spread over the East and West wall. The screens are clogged with soot and need to be cleaned.

The overflow pipe is severely corroded and needs to be sand blasted and coated with an epoxy. There is a chance that the pipe might not survive the rehab as we have seen the pipe fail from the excessive corrosion.

### Recommendations

The following recommendations are provided for your use:

The Rialto 2 MG reservoir appears to be in good condition for a tank over 45 years of age. The following recommendations are based on our experience as a specialist in the concrete tank industry. Please keep in mind that the tank will not meet current codes for seismic. To bring this tank up to code, a new tank would be less expensive than a seismic upgrade. The sloped walls inside the tank make a widening of the wall to handle the seismic load difficult to design. Only a company that specializes in concrete tank restoration should conduct this work. I would be happy to give you recommendations upon request.

- The joints require a new caulking. As the material in place is rock hard, the best way to accomplish this is to create an external water stop using an elastomeric with expansion capabilities over 250%. A fabric scrim will be used between the 2 coats. An 8" wide external water stops over the floor and wall joints and a 1' wide strip over the wall/sloped floor transition as well as the slope floor to flat floor should suffice.
- The tank requires a good thorough cleaning.
- The Vents need to be cleaned and possibly replaced
- The interior overflow pipe should receive proper preparation and re-coating of an NSF approved epoxy.
- The ladder should be replaced with one that extends from the exterior wall so that tank entry is safely done.
- The spots on the interior vertical wall should receive a 4" elastomeric coating without the scrim.
- Each column should have an elastomeric 4" coating around the parameter joint.

- Pictures are all on a separate disk

Thank you,

Mark Moore

RSH Construction

A Division of Associated Construction and Engineering

619-838-9349 Cell

[mmoore@a-c-e-inc.com](mailto:mmoore@a-c-e-inc.com)



# EXHIBIT B



**Project:** Rialto, CA Joint Replacement

**Date:** 01-28-2020

**Attention:**

RSH Construction Service (RSH) is pleased to submit our pricing for the West Valley Water District Joint Replacement Project

Item	Item Description	Qty	Units	Unit Price	Total
1	Mobilization	1	EA	\$2,000	\$2,000
Option 1	Removal and Re-Installation of Joint Filler (Non-Asbestos)	2200	LF	\$35,000	\$35,000
Option 2	Coating/Sealing of Filer Joints with CIM 1061.	2200	LF	\$47,000	\$47,000

**Total Price**

**Option 1** **\$37,000**

**Option 2** **\$49,000**

**Scope of Work-**

1. RSH will pressure wash the interior of the tank to clean off any existing debris.
2. RSH will provide all labor, equipment, and materials to remove approximately 2200 LF of existing joint filler from the interior of the tank. RSH will use pressure washer and mechanical tooling to remove the existing filler. We will clean the substrate and apply new filler.
3. RSH will provide all labor, equipment, and materials to clean and prep all areas 1' out from the corner joints, and 6" out from control, expansion, and column joints. We will then apply 50-60 mils of CIM 1061 to all joints.
4. RSH will washdown and disinfect the interior of the tank once repairs have been made.

**Exclusions-**

- Site survey, inspections, concrete testing
- On site project management, safety, and QA.
- Export of spoils, import
- Overtime, weekend, or holiday work
- 1 mobilization included; additional mobilizations charged at \$2,000 each



CANYON SPRINGS ENTERPRISES  
DBA RSH CONSTRUCTION SERVICES

**CANYON SPRINGS ENTERPRISES**  
**DBA RSH CONSTRUCTION**  
**License No.: 806747**

3883 Wentworth Drive • Hemet, CA 92545  
P.O. Box 2810 • Hemet, CA 92546  
Phone: (951) 925-2288 • Fax: (951) 925-1288

3.h.b

- Construction water source
- Lock out tag out of all utilities
- Permits
- Fire protection
- Removal, handling, storing, or disposal of hazardous materials
- All items not specifically included in RSH scope of work

Please contact the undersigned if you have any questions or require additional information.

Sincerely,

Eric Jerabek  
Estimating

**Joanne Chan**

---

**From:** Joe Schaack  
**Sent:** Thursday, February 6, 2020 9:05 AM  
**To:** Joanne Chan  
**Subject:** FW: Re-sealing of joints in concrete reservoir.

**From:** John Kitson [mailto:jkitson@kitsoncontracting.com]  
**Sent:** Tuesday, February 4, 2020 11:20 AM  
**To:** Joe Schaack <jschaack@wvwd.org>  
**Subject:** Re: Re-sealing of joints in concrete reservoir.

Joe, we recently finished a very similar job in Altadena.  
 Remove/replace approx (NTE) 2200 LF sealant in water tank. Remove debris.  
 Materials: SIKA 2C, backerrod  
 Exclusions: no cleaning, water blasting, disinfecting of tank, any engineering testing or reporting.  
 Estimated cost, conditions to be verified before signing contract or Purchase Order.  
**\$98,800.00**

John Kitson  
 Kitson Contracting Inc.  
 Office 626-441-2302  
 Cell 626-840-2107  
 Fax 626-441-2381  
 Please visit our website  
[www.kitsoncontracting.com](http://www.kitsoncontracting.com)

On Feb 4, 2020, at 9:58 AM, Joe Schaack <[jschaack@wvwd.org](mailto:jschaack@wvwd.org)> wrote:

Hello John,

As we discussed, here is a description of the work we would like a quote on and some pics of the interior of the reservoir.

1. Contractor will provide all labor, equipment, and materials to remove approximately 2200 LF of existing joint filler and misc. debris from the interior of the tank. Contractor will use pressure washer and mechanical tooling to remove the existing filler. Contractor will clean the substrate and apply new filler.
2. Contractor will provide all labor, equipment, and materials to ensure that entry into reservoir complies with OSHA confined space regulations.
3. Contractor will ensure all debris is removed then wash down and disinfect the interior of the tank once repairs have been made.

**Joanne Chan**

---

**To:** Joe Schaack  
**Subject:** RE: Quote for re-sealing concrete reservoir.

---

**From:** Ford, Matt [<mailto:Matt.Ford@dntanks.com>]  
**Sent:** Wednesday, February 5, 2020 8:22 PM  
**To:** Joe Schaack <[jschaack@wvwd.org](mailto:jschaack@wvwd.org)>  
**Subject:** RE: Quote for re-sealing concrete reservoir.

Hi Joe,

I hope you got my voicemail earlier today. As I mentioned in the voicemail, we don't have capacity to take on a joint sealant project right now, but we appreciate you and Mark reaching out to us.

Thanks,  
Matt

**Matthew Ford, P.E.** | Regional Manager, *CTS Western Region*  
**DN TANKS | Concrete Tank Services**  
P.O. Box 696, El Cajon, CA 92022-0696  
Main Office 619.440.8181  
Direct 619.270.4546 | Cell 781.457.8640 | Fax 619.440.8653  
[www.dntanks.com](http://www.dntanks.com)

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**From:** Joe Schaack <[jschaack@wvwd.org](mailto:jschaack@wvwd.org)>  
**Sent:** Wednesday, February 5, 2020 10:34 AM  
**To:** Ford, Matt <[Matt.Ford@dntanks.com](mailto:Matt.Ford@dntanks.com)>  
**Subject:** Quote for re-sealing concrete reservoir.

**This message originated from outside DN Tanks**

---

Hello Matt,

Would there be any possibility of getting a quote from you today for re-sealing that 2.0 million gallon concrete reservoir? We're hoping to make a deadline to present it to our Board. This is the reservoir Mark sent you the report on.

Thank you,

Joe Schaack  
Production Supervisor  
West Valley Water District  
Office: (909) 875-1804 Ext. 359  
Cell: (909) 936-4584